

TROPICAL DISEASES BULLETIN

ISSUED UNDER THE DIREC-
TION OF THE HONORARY
MANAGING COMMITTEE

VOL. 39 (Nos 1-12.)
JANUARY-DECEMBER 1942.

BUREAU OF HYGIENE AND TROPICAL DISEASES
Keppel Street W C 1

1942.

HONORARY MANAGING COMMITTEE APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES

Chairman

A G H Smart, C.M.G., M.B.E., M.D. D.P.H. D.T.M. & H.
(Chief Medical Adviser to the Secretary of State for the Colonies)

Wm Horner Andrews, D.Sc., M.R.C.V.S.

Sir Wilson Jameson, LL.D. M.D., F.R.C.P.
(representing the Ministry of Health)

Sir Arthur Horn, C.M.G., M.D. M.R.C.P., D.T.M.

Professor Sir John Ledingham, C.M.G., LL.D., D.Sc., M.B., F.R.C.P., F.
(representing the Royal Society)

G Carmichael Low, M.D., F.R.C.P.

Sir Philip Manson-Bahr, C.M.O., D.S.O. M.D., F.R.C.P., D.T.M. & H.
Major-General Sir Ernest Broadbent, K.C.I.E., I.M.S. (retd.)

Sir Edward Mellanby, K.C.B. D.Sc., M.D., F.R.C.P., F.R.C.H.P.
(representing the Medical Research Council)

Lt-Col G S Parkinson, D.S.O. M.R.C.S. L.R.C.P. D.P.H. R.A.M.C. (retd.)

The Honourable E. Baring
(representing the Foreign Office)

J B Sydenham
(of the Colonial Office)

Secretary C A Crossmuth of the Colonial Office

STAFF OF THE BUREAU

Acting Director

Charles Wilcock, M.D., D.T.M. & H.

Secretary

R. L. Sheppard.

SECTIONAL EDITORS, TROPICAL DISEASES BULLETIN

Professor P A Buxton, M.A. M.R.C.S. L.R.C.P. D.T.M. & H.

Lt-Col. E. D. W. Gregg, C.I.E., D.Sc. M.D., F.R.C.P.E., I.M.S. (retd.)

Lt-Col. W F Harvey, C.I.E., M.B. F.R.C.P.E., D.P.H. I.M.S. (retd.)

Professor Edward Hindle, M.A., Sc.D. Ph.D. F.R.S.

Lt-Col. H. Kirkpatrick, M.B. B.Ch., I.M.S. (retd.)

Lt-Col. Clayton Lane, M.D. I.M.S. (retd.)

Lt-Col. A G Nichol, D.Sc. M.B. Ch.B. F.R.C.P.E., I.M.S. (retd.)

Maj-Gen. Sir John W D Mowbray, K.C.I.E. D.Sc. M.B. B.Ch. I.M.S. (retd.)

Maj-Gen. Sir Leonard Rogers, K.C.S.I., C.I.E., M.D., F.R.S., I.M.S. (retd.)

Hugh Stannus Stannus, Ph.D., M.D., F.R.C.P. D.T.M. & H.

M. Sydney Thomson, M.A., M.D. F.R.C.P.

C M Venyon, C.M.G., C.B.E., M.B. B.S., B.Sc. F.R.S.

P Norman White, C.I.E., M.D., D.P.H. I.M.S. (retd.)

Professor Warrington York, M.D., F.R.C.P., F.R.S.

CONTENTS.

SPECIAL ARTICLES

The Physiology of the Small Intestine its Application to the Aetiology of Sprue	Z. A. LEITNER	497-508
The Treatment of Malaria. A Review of Some Recent Papers	Norman WHITE	801-806

SUMMARIES OF RECENT ABSTRACTS (1941)

Cholera	1-5	Plague	421-427
Adenitis	308-513	Trypanosomiasis	285-290
Leishmaniasis	359-365	Typhus Group of Fevers	655-663
Leprosy	729-736	Yellow Fever	61-64
Malaria	129-137		207-216

SECTIONS

Amoebiasis and Other Intestinal Protozoal Infections	28-33	313-319
	554-556	618-621 692, 765-766 839-845
Bartonellosis		682-683 831-833
Beriberi		328-334
Blackwater Fever		264-277 525-532 670
Cholera	157-167	458-460 617-618 690 764 836-839
Deficiency Diseases	325-328	478-479 573-575 635-637
		709-711 784-785 877-882
Dengue		833-834
Dermatology and Fungous Diseases	102-115	484 642-646
		789-791
Dropsy, Epidemic.		339-342 711-713
Dysentery Bacillary	33-37	319-325 552-554 690-692
Haematology	480-483	639-640 716-718 785-787 883-884
Helminthiasis	5-16	89-102 182-197 463-478 560-573
		624-635 698-709 767-784 858-866
Leishmaniasis	167-176	447-452 537-538 607-611 673-674
		746-750
Leprosy	216-233	461-463 557-560 621-623 695-698
		766-767 850-858
Leptospirosis		124-128 346-347 847-849
Malaria	16-27	115-124 176-182 250-263 290-300 387-401
	427-441	513-525 592-605 663-670 736-743 806-815
Miscellaneous	47-58	197-204 277-281 348-351 410-420
	482-493	575-579 646-653 721-723 791-798 890-900
Ophthalmology Tropical		401-404 886-890
Pellagra and Allied Conditions		334-339
Plague	300-313	549-552 616-617 687-689 762-764 834-836
Rabies		79-88 588-592

CONTENTS—cont

SECTIONS—cont

Relapsing Fever	124-218	342-345	556-557	692-694	846-847
Reviews and Notices	53-60	205-208	281-284	352-358	
	493-496	530-582	723-728	798-800	
Special Research Section.				853-854	
Sprue	43-47	490	637-639	713-718	882-883
Trypano-miasis	233-249	442-447	532-537	605-607	671-672,
				743-748,	815-821
Typhus Group of Fevers	137-157	365-387	452-454	538-549	
	611-615	674-682	750-759	821-831	
Venoms and Antivenoms	405-410	640-642	718-720	787-789	
				834-836	
Yaw and Syphilis		38-43	460-461	695	849-850
Yellow Fever	64-79	455-458	543-549	615	653-652,
				759-767,	833
Index of Authors					901-919
Index of Subjects					920-947
Index of Countries					947-953

ILLUSTRATIONS.

Detail of tip of needle (with and without obturator) for use in aspiration biopsy	47
Map of Africa showing distribution of positive immune test to yellow fever	66
Map of Africa showing distribution of yellow fever 1921-1941	67
Sketch map of yellow fever epidemic area in Nuba Mountains	69
Marked slide for observation of vertical migrations of infective nematode larvae	98
Keratoderma in Punta	111
Advanced case of infantile cirrhosis of liver	416
Part of temperature chart of patient harbouring <i>T. evansi</i> in blood	447
Diagram of faeces container	463
Section of ileum showing structure of villi	488
X-ray picture showing partial obstruction at junction of 1st and 2nd parts of duodenum with megacolon	502
X-ray picture showing abnormal mucosal pattern and narrowing of lumen of upper jejunum	523
Plan of fascine drain under construction	523
Graph illustrating type of analysis of experimental data used to estimate tubular reabsorption of haemoglobin	528
Case mortality from dysentery in Egypt in 1928-40	691
Diagrams illustrating NIH swab Graham swab and Frosst swab for diagnosis of pinworm infection	780

TROPICAL DISEASES BULLETIN.

Vol. 39]

1942.

[No. 1

SUMMARY OF RECENT ABSTRACTS *

I CHOLERA

Epidemiology

In the epidemiology of cholera emphasis is laid on the existence of endemic foci in inter-epidemic periods and on the association of outbreaks with high humidity and rainfall.

In the Annual Report for 1940 of the Eastern Bureau of the League of Nations Health Organisation (p. 578) it is pointed out that endemic foci of cholera are established in China as well as in British India. These centres are in the Yuan River valley of Hunan in the upper reaches of the Yangtse basin and in the hinterland of certain Chinese ports. Infection is principally water borne especially in river water but in some places wells play a part while infection may be conveyed by flies or by eating foods washed with contaminated water.

In the same publication it is reported that since 1910 the mortality in British India has tended to decline. There is a tendency for cholera to persist in endemic form after epidemics. It is noted that eight cases of *El Tor* vibrio infection in Celebes occurred in 1940 and that five of these were fatal. In sea and air ports the association of high relative humidity with high temperature accompanied by intermittent rains represents the most favourable conditions for the development of the disease in epidemic form. On this basis forecasts of epidemics may be made.

In Bengal CHATTERJI (p. 210) reports that there was an epidemic of cholera during 1938 in spite of the extensive anti-cholera measures which had been taken. This was attributed to the unforeseen occurrence of floods. From the Central Provinces and Berar MAHAND (p. 579) reports that in 1939 the largest number of deaths occurred during the period August to October. Rainfall was most heavy in the period June to September with the peak in July and August.

VENKATARAMAN (p. 212) remarks that in the Tanjore district of the Madras Presidency the Ogawa type of *V. cholerae* was isolated during the epidemic periods of 1936, 1937 and 1939 but that during 1938 a year of low incidence the Inaba type was found.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Aetiology

LINTON (p. 580) discusses the chemistry and serology of vibrios. The true cholera vibrio is by common consent, that which (1) ferments mannose and sucrose but not arabinose (2) does not haemolyse goat erythrocytes, and (3) agglutinates with O-group I serum. But the haemolytic *V. cholerae* causes a disease very like true cholera, and it is not yet known if a non-haemolytic vibrio can become haemolytic. The author finds it difficult to insist that the cause of cholera is a distinct entity utterly unrelated to other vibrios and quotes DE MOOR who considers cholera to be similar to bacillary dysentery in that it may be caused by bacteriologically different organisms. It is evident that further work is called for.

FOURNIER (p. 212) has studied 1 130 strains of *V. cholerae* isolated in Shanghai under epidemic conditions. The strains all possessed certain definite characters on isolation and belonged mainly to the intermediate Hikojima type. These characters have remained constant in epidemics, at least since 1921 and point to the endemicity of the disease in the Shanghai region. All the agglutinable vibrios belonged to Group 1 of Heiberg—the Voges-Proskauer reaction was consistently negative. Some of the agglutinable vibrios possessed slight haemolytic power on isolation, but this power appears to be lost after a few months of subculture. Even in non-haemolytic strains, however, there is a phase between the 6th and 12th hour of cultivation, when haemolysis may be observed. It appears that the cholera vibrio produces both a haemolysin and a neutralizing substance, the latter appearing in culture rather later than the former.

By subjecting typical cholera vibrios to the action of different combinations of cholera-phage types VARDON (p. 213) has succeeded in obtaining a number of variants. He concludes from his experiments that the change from the agglutinable to the non-agglutinable state which TOURS and MAITRA claim to take place in cholera vibrios in tank waters [but which AHUJA failed to confirm, see this *Bulletin* 1939 Vol. 36 p. 697] is due to the presence of cholera-phage and that phage-infected water vibrios, though avirulent, may revert to the virulent parent cholera vibrios if they are able to rid themselves of the cholera-phage infection.

VENKATARAMAN (p. 212) found that agglutinable vibrios remained viable for at least 74 days in water with a salt concentration of 2 per cent. in 3 per cent solution they could not be recovered after 32 days. [See also GENEVAY and BRUNEAU this *Bulletin* 1939 Vol. 36 p. 1. The total salinity of ocean water is from 3.3 to 3.7 per cent.]

VENKATARAMAN (p. 212) states that in the examination of water supplies by means of the mannose-bismuth-sulphite method of enrichment non-agglutinating mannose-fermenting vibrios could be obtained from practically every tank and river water examined, and that this method of enrichment is therefore not capable of yielding a differential isolation of *V. cholerae* under those circumstances. WILSON and REILLY (p. 211) publish the details of modifications of the fluid and solid media originally introduced by Wilson and Blair for the differential isolation of *V. cholerae*. For the details the original abstract should be consulted.

HUANG *et al.* (p. 579) conclude from their investigations that the failure of bacteria to grow on used agar media, which have been sterilized, is due to inhibiting substances left over from previous cultivation.

Under present circumstances it is not easy to obtain supplies of agar and the authors have devised a method of washing used and sterilized agar so that with the addition of some fresh agar satisfactory media may be prepared from it. Such media have been used repeatedly for the growth of *V. cholerae*.

BASU *et al* (p 581) have studied the properties of a diffusate obtained by immersing a cellophane bag containing sterile salt solution in a growing culture of *V. cholerae* for five days. This diffusate which did not contain any histamine-like substance caused restlessness, cramps, paresis and signs of imminent death in rats but these passed off in 24 hours. The diffusate contains carbohydrate but practically no protein gives rise to antibody formation and protects against *V. cholerae*.

WHITE (p 214) has devised a method by which a suspension of the flagella of *V. cholerae* may be obtained.

From an investigation of the antigens of *V. cholerae* WHITE (p 214) concludes that the major component in the somatic agglutination of R and ρ vibrios is a heat stable antigen which though probably containing some protein also includes a polysaccharide haptene. He (p 214) has extracted a heat-stable somatic protein antigen from *V. cholerae*. He gives a list of the various fractions which have now been separated from the bodies of the vibrios and states that antibodies to all these components may occur in the sera of rabbits immunized with living cultures of *V. cholerae*.

Pathology

FÖLDES (p 583) describes a method based on the original Hammer schlag chloroform benzene mixture of determining the specific gravity of blood and body fluids. The method involves the use of a special glass vessel which is illustrated.

PASRICHA and MALIK (p 583) give an account of the blood in cholera. There is increase in cell volume, in haemoglobin percentage, in urea and non protein nitrogen, in total plasma proteins, fibrin and globulin, in organic phosphates and in the glucose concentration. There is decrease in the moisture content of blood and plasma but this is not marked in the acute stage and in the concentration of sodium chloride though this is not great. CHATTERJEE and SARKAR (p 583) also give the results of blood investigations in cholera. They find an increase of potassium, inorganic phosphates and of urea and non-protein nitrogen with a decrease of sodium, calcium, chlorides and blood sugar. These authors point out that one of the most important features is acidosis which they note is also found in shock with its marked decrease in alkali reserve. In shock there are also the same changes in the serum electrolytes and the same hypoglycaemia.

GHOSH and CHAKRABORTY (p 585) have investigated the chemical constituents of fresh stools in cholera. All are highly alkaline and the authors relate this fact to the known fact that *V. cholera* grows abundantly in highly alkaline medium. Elimination of alkaline base and of chlorides leads to acidosis and disturbs osmotic balance and it is thought that the latter may have some bearing upon suppression of urine.

CHATTERJEE (p 582) describes the pathological changes in the kidney in cholera. These are not inflammatory, most of the congestive change is ascribed to the action of a histamine-like substance [but see BASU *et al* above] and anuria is thought to be due to low blood

pressure. The author thinks that the morphological changes in the kidney are in some way connected with a hypersensitive state developed in the course of the disease.

Clinical

For rapid diagnosis which can be carried through in four to five hours, WAKAMIYA (p. 211) adds faeces to peptone water on the surface of which *V. cholerae* grows as a film. Transfer of growth from this film is made by platinum loop into serum diluted 1 in 200 which is incubated. The vibrios are easily isolated and agglutination is evident. PASRICHA *et al* (p. 580) describe a dilution method for the isolation of pathogenic bacteria from faeces. This method for the details of which the original abstract should be consulted, has given better results than direct plating in the search for *V. cholerae* and *Bact. typhosum*.

MITRA (p. 215) writes that, in treatment cholera-phage is most effective in the early stages of the attack, but that when dehydration has occurred cholera-phage treatment must be supplemented by transfusion of saline. He further states that the use of cholera-phage invariably cuts short epidemics of cholera provided that immediate steps are taken to administer it to the whole population exposed to infection.

Control

YING (p. 585) has conducted important investigations on the persistence of *V. cholerae* in the stools of 200 patients. He notes, incidentally, that the average duration of acute symptoms was 4.8 days. It was found that in 98 per cent. the last positive culture was obtained by the second week, but that in a few cases positive cultures were obtained in the third or even the fourth week. It is therefore dangerous to send away active cases as soon as acute symptoms subside. In the absence of laboratory controls cholera patients should be isolated for two weeks from the onset or at least for one week from the beginning of convalescence.

A plan for the prevention and control of epidemics has been evolved by the National Health Administration of China (p. 578). This is applicable to all tropical countries and consists of (1) a preliminary survey and organization, (2) prevention of epidemics by means of quarantine stations and the institution of sanitary measures, hospitals and personnel, (3) control of epidemics entails the creation of mobile teams, the organization of large-scale anti-cholera inoculations, the safeguarding of water supplies, the control of the sale of food and drink, the supervision of general sanitary measures and the treatment of patients. For the last, hypertonic saline is more satisfactory than normal saline in the early stages, but for severely dehydrated patients normal saline alone should be given at first. BORCAR (p. 211) notes that in a small outbreak of cholera among the fishing folk of a small Portuguese settlement of Gogola on the Kathiawar peninsula, the control measures taken were rapid isolation and treatment of the sick, immediate evacuation of contacts, vaccination, disinfection and domiciliary inspection. These were carried out with vigour and the outbreak did not assume serious proportions. In the Central Provinces (p. 579) the principal preventive measures in use are vaccination, disinfection of water supplies and the distribution of Tomb's essential oil mixture.

Among the anti-cholera measures taken in Bengal CHATTERJI (p 210) refers to the work done to improve rural water supplies

Charles Wilcocks

HELMINTHIASIS

- 1 RENAULT (Livio) & VERSIANI (Waldemar) Parasitismo humano por helmintos e protozoarios em Bello Horizonte Dados estatísticos. [Statistics regarding Helminths and Protozoa found in Man in Bello Horizonte.]—*Brasil Medico* 1940 July 20 Vol 54 No 29 pp 487-492. [11 refs.] English summary
- 11 CANÇADO (J. Romen) Estudo sobre a frequencia dos parasitas intestinaes humanos Commentarios a proposito de 1 000 exames de fezes. [The Incidence of Parasites in the Intestines of Man as displayed by 1,000 Faecal Examinations.]—*Brasil Medico* 1940 Aug 17 Vol. 54 No 33 pp. 551-558. [40 refs.]

1 From various sources the Instituto Biologico Ezequiel Dias Bello Horizonte has examined 6 000 fresh faeces in the two years 1937-39 using two smears one in normal saline and one in Lugol solution and in addition when Mansonian schistosomiasis has been suspected a preparation by the gravity precipitation method of HOFFMAN PONS & JANER [this *Bulletin* 1934 Vol 31 p 778] The authors give these tabulated figures for discovered percentages of infection as well as others for age sex, employment and residence of those examined.

ii The Laboratorio Carlos Chagas Bello Horizonte has examined 1 000 faecal specimens using the same concentration method as modified by MARTINS [this *Bulletin* 1937 Vol. 34 p 799] and also that of DE RIVAS [this *Bulletin* 1928 Vol. 25 p 447] and has obtained the tabulated results —

	i Instituto Biologico Ezequiel Dias Bello Horizonte. % positive	ii. Laboratorio Carlos Chagas Bello Horizonte % positive
<i>Ascaris lumbricoides</i>	19.80	19.2
<i>Strongyloides stercoralis</i>	17.26	8.2
<i>Necator americanus</i>	16.99	15.2
<i>Trichuris trichiura</i>	12.96	22.1
<i>Schistosoma mansoni</i>	10.88	2.3
<i>Taenia</i> sp	0.75	0.8
<i>Enterobius vermicularis</i>	0.43	2.8
<i>Hymenolepis nana</i>	0.08	0
<i>H. diminuta</i>	0.01	0
<i>Entamoeba coli</i>	16.43	23.8
<i>Giardia intestinalis</i>	9.40	10.8
<i>Entamoeba histolytica</i>	8.33	12.5
<i>Endolimax nana</i>	6.08	1.5
<i>Chlamydomonas mesnili</i>	2.31	8.1
<i>Iodamoeba bütschlii</i>	2.20	—
<i>Trichomonas hominis</i>	2.06	1.4
<i>Balantidium coli</i>	0.15	0.2
<i>Enteromonas hominis</i> (?)	0.08	—
<i>Embadomonas intestinalis</i>	0.01	—
<i>Blastocystis hominis</i>	—	33.0

Clayton Lane

MURO (Sangoro) On the Results of a Faecal Examination of Patients in Muto Children's Hospital during the Last 3 Years.—*Tokyo Igakai Zasshi* (Jl. Med Assoc. Formosa) 1941 Mar Vol 40. No 3 [In Japanese pp 490-499 [15 refs] English summary p. 500]

MANSON BAEH (P. H.) Modern Therapeutics. XXII. The Modern Treatment of Intestinal Parasites.—*Practitioner* 1941 Apr Vol 148 No 4 (874) pp 271-278.

A valuable survey of anthelmintic drugs that have been given for the various helminths, with advice as to lines of treatment. Among the drugs which are stressed is phenothiazine for thread worms, children from 5 to 10 years old getting 15 grains daily for at least 10 consecutive days for children under five this dose is halved. C L

DEEDE (Floyd) & THOMAS (John O.) Studies on Phenothiazine. IX. The Biliary Excretion and Anthelmintic Action of Thionol.—*Jl. Parasitology* 1941 Apr Vol 27 No 2. pp 143-151

"The evidence presented is, at least highly suggestive that the anthelmintic action of phenothiazine is due to the thionol excreted into the intestine by way of the biliary tract and that bile facilitates this action.

On oxidation phenothiazine becomes first leucothionol and then thionol, and when the first is given by mouth all three substances are found in the faeces but equally all three are found in the bile got by puncturing the gall bladder of rabbits and dogs killed six hours after they have been given phenothiazine by mouth. It is then an open question whether these chemical substances found in the intestine have been formed there and not absorbed, or whether after absorption of phenothiazine they have been formed and excreted through the bile. Further the good fortune of discovery of a man with a biliary fistula enabled it to be established that the same absorption and the same excretion by the liver occurred when he was being treated by phenothiazine for infection of the urinary tract. Bile secured before the drug was given was free of the drug and its two oxidation products and that got after its administration contained all three substances. Controlled experiments showed that phenothiazine had no demonstrable action *in vitro* on *Ascaris lumbricoides* from the pig that thionol first stimulated and then depressed the worm, the latter action persisting as long as thionol was in adequate concentration and that bile added to the depressing action.

(If then thionol is the active anthelmintic agent, and since all persons may not be equally good at bringing it into being the giving of thionol with or without bile may well be the next step in this line of treatment.) C L

EMINGTON (B. J.) Phenothiazine as an Equine Anthelmintic.—*J. of Med* 1941 Vol 38 pp 188-193 [Summary taken from *Vet. Bull* 1941 Oct Vol 11 No 10 pp 719-720. Signed H. E. HARBOUR]

E. discusses a number of cases in which toxic symptoms occurred following administration of phenothiazine to horses, and advocates caution in dosing with this highly efficient anthelmintic. Manifestations were of anaemia, albuminuria, and haemoglobinuria four cases

of nephritis are mentioned although it was not certain that these were directly due to the drug's action. Red blood cell counts showed a decrease of at least a million per cu mm in 28 out of 39 animals examined. In a few of these cases the degree of anaemia was severe. Haemoglobinuria was not seen in mature animals following single 30 g doses. Albuminuria was most often produced in animals which had been previously dosed. One instance is cited which tended to show that some samples of the commercial product might be more toxic than others.

E. advises the use of 30 g doses for animals the size of mature thoroughbreds. For immature horses of this type a dose of 15 g is suggested as adequate. Dosage should never exceed 50 g in any horse. There appeared to be no reason for fasting before administration (many of the animals showing haemoglobinuria had been fasted prior to dosing). Animals showing a tendency to constipation might be given laxative feeds before dosing. The use of mineral oil at the time of dosing was of questionable value. Division of the dose over two successive days gave efficient results but did not appear to affect absorption. The question as to how soon a dose could be repeated remained to be settled. Age and pregnancy were factors which had to be considered in dosing.

SANDGROUND (J. H.) Coma following Medication with Tetrachlorethylene.—*Jl Amer Med Assoc* 1941 Aug 9 Vol. 117 No 6 pp 440-441

Sandground adds two cases to the record of coma following administration of tetrachlorethylene.

He refers to KENDRICK'S case in the Madras Penitentiary which MAPLESTONE and MUKERJI regarded as unique and of no real importance as an argument against the drug's safety. He notes that these writers doubtless overlooked an administration by WRIGHT, BOZICEVICH & GORDON [this *Bulletin* 1938 Vol 35 p 381] in which a boy of 11 received a dose of 11 cc in 30 cc of a saturated solution of magnesium sulphate to which had been added 60 cc of water. He became cyanotic in 1½ hours and in the next half hour became unconscious four times.

He himself had taken the drug four times in doses of 4 to 5 cc. with drowsiness and a light sleep if he let himself go, such apparently being its normal action. And he describes two cases with deep coma. One was a young Javanese schizophrenic man in an advanced catatonic state who received 4.5 cc. of the drug and became comatose with all peripheral reflexes abolished. An intravenous injection of Metrazol gave no immediate result but he came out of coma two hours later and had no other symptoms. The drug was pure and it was thought that such anaesthesia might be disregarded in future work. Javanese later being given doses of 2 to 3 cc without ill effect. In the Celebes Islands the doses used were 1 to 4 cc. in patients between 6 and 60 years old.

Not one of the recipients was sufficiently affected by tetrachlorethylene to discourage other members of the patient's family from requesting the medicine.

"It was consequently a matter of great surprise and not a little consternation when, after an uneventful taking of 5 cc. of tetrachlorethylene by

me to eliminate an experimentally induced infestation with flukes, a second member of the expedition fell into deep coma after taking a much smaller dose of the same drug a few days later.

"Case 2. A healthy well developed man, with nothing in his past history or present condition which would lead one to anticipate that the drug would not be well borne, was given a smaller quantity of the drug solely to determine its vermifugal efficacy on a quantitative basis. Three cc. of well emulsified tetrachlorethylene was taken with a quantity of water into an empty stomach.

While awaiting the lapse of half an hour before taking a saline purgative he proceeded to make himself comfortable in an armchair and commenced to read. Ten minutes later he was seen to be breathing deeply as though in profound sleep. Attempts to awaken him were futile. The muscles were completely relaxed, most of the reflexes had disappeared, the pupils were somewhat constricted and the pulse remained full, strong and regular. This condition persisted for nearly two hours, at which time an intravenous injection of metrazol was given. To this injection there was immediate response but although the subject regained partial consciousness it was several hours before the stupor had worn off completely. He recalled nothing after taking the drug, expressed his satisfaction at having had a restful sleep and proceeded to assist in washing the stools that he passed for the worms contained therein.

Comment

Both of these cases presented what appeared to be the action of a general anesthetic akin to ethylene or chloroform. They obviously indicate the need for hospitalizing or otherwise keeping under close surveillance all patients who are treated with tetrachlorethylene even in doses smaller than are usual. While for want of a better drug they should not discourage the use of tetrachlorethylene, they illustrate the truth of a remark which the late Dr. Maurice Hall made to me, to the effect that one cannot assume that any anthelmintic is entirely safe for human use until there are reliable reports on at least a million treatments without any untoward effects.

C. L.

PARACITA (J. Valencia). La estadística en la clínica de la *Schistosomiasis mansoni* digestiva. [Statistics of *S. mansoni* Infection of the Bowel.]—*Gac. Med. de Caracas* 1941 Jan 31 & Feb 15 Vol 48. Nos. 2 & 3 pp. 191-194. 196-200.

BRUNET (E). Observations biologiques diverses concernant *Planorbis* (*Australorbis*) *glabratus* hôte intermédiaire de *Schistosoma mansoni*. [Biology of *P. glabratus*.]—*Ann. Parasit. Humains et Comparée* 1941 Vol 18 No. 1-2-3 pp. 9-45. With 7 figs. & 1 plate. 57 refs.]

Mansonian schistosomiasis may be prevented—(1) by stopping promiscuous defaecation which may infect snails, a measure that has proved impracticable, (2) by treatment of infected men, disappointing in practice, (3) by getting rid of the snail intermediary. To do the last satisfactorily in Venezuela the biology of *P. (A.) glabratus* must be known and the paper records observations on this point.

This snail is widespread in South America. If the vegetation to which it is attached is agitated it rapidly floats and its presence in any stretch of water is disclosed, experiment in a tub showing that 70 per cent of the snails float in this way. The addition of one part of sea water to three parts of fresh is fatal to this *Planorbis* even if the

addition is slowly made but in the weaker mixture of one of sea water to four of fresh water they can live for 35 days though they neither feed nor oviposit yet if taken from the stronger solution when seemingly at the point of death they appear to become normal in about a fortnight. At 25°C. hatching takes place about 10 days or a little later after oviposition the young live first on microscopic fauna and flora and then collect on any lettuce leaves placed at their disposal. Development is quicker in ample water thus when kept singly in 80 cc of water they began to oviposit on the forty-sixth day when 274 were put in three litres of water (11 cc per head) development was much slowed the surface area is held to be of little importance here. At 25°C they produce six generations yearly and this is their probable rate of reproduction in tropical countries.

Probably not more than 20 000 to 25 000 of the local inhabitants of Venezuela are infected though the local percentage of infection of *P. glabratus* in nature may be as high as 100. Brumpt corrects his statement [this *Bulletin* 1941 Vol 38 p 41] that the tentacular lesions there pictured had not been reported before they were described by GORDON DAVY and PEASTON for *S. mansoni* in *Planorbis pfeifferi* in Sierra Leone [this *Bulletin* 1935 Vol 32 p 237].

These considerations applied to prophylaxis lead to the following advice. Useless collections of water should be pumped empty. Irrigation and drainage canals should be regularized or better still replaced by cement drains. Satisfactory collections of snails by hand will be hard to effect. Seawater in a strength of 35 to 40 per cent maintained for several days destroys the snails. If need for economy allows sulphate or carbonate of copper quicklime or sulphate of ammonia may be used for this purpose. The planting beside open water of acclimatized *Balanites aegyptiaca* merits trial. Animal enemies of the snail are considered including the small *Helobdella* leaches which though rarely are found in collected snails similarly certain water insects attack this *Planorbis* but are too rare in nature to be effective in destruction and probably cannot be increased in numbers nor is there any parasite known to castrate *Planorbis* as does a parasite of the duck so destroy *Bithynia* which is the intermediate host of *Clonorchis sinensis*. C. L.

MEIRA (João Alves) Considerações sobre os aspectos retosigmoidoscópicos e os quadros radiológicos do grosso intestino na esquistossomose mansoni (Doença de Manson Pirajá da Silva) [Retro-sigmoidoscopy and Radiology of the Large Intestine in Mansonian Schistosomiasis.]—*Ann. Paulist. Med. e Cirurg.* 1941 Apr & May, Vol. 41 Nos 4 & 5 pp 317-24 327-30 333-4 337-44 389-90 393-4 397-412, 415-28 [31 refs.] With 19 figs. English summary.

Of the 36 cases dealt with both methods of examination were carried out in 19.

To the sigmoidoscope conditions were normal throughout the visible parts in 4 in 3 there was catarrh of the rectum extending to the sigmoid in 9 there were granulations and hypertrophy and in 2 there was ulceration in 1 the proctitis was atrophic in 2 erosive and in 2 there was diffuse congestion condylomata prolapse and fistula were each present in 1 and in 2 piles.

me to eliminate an experimentally induced infestation with flukes, a second member of the expedition fell into deep coma after taking a much smaller dose of the same drug a few days later.

Case 2 A healthy well developed man with nothing in his past history or present condition which would lead one to anticipate that the drug would not be well borne, was given a smaller quantity of the drug solely to determine its vermifugal efficacy on a quantitative basis. Three cc of well emulsified tetrachlorethylene was taken with a quantity of water into an empty stomach.

"While awaiting the lapse of half an hour before taking a saline purgative, he proceeded to make himself comfortable in an armchair and commenced to read. Ten minutes later he was seen to be breathing deeply as though in profound sleep. Attempts to awaken him were futile. The muscles were completely relaxed, most of the reflexes had disappeared the pupils were somewhat constricted and the pulse remained full, strong and regular. This condition persisted for nearly two hours, at which time an intravenous injection of metrazol was given. To this injection there was immediate response but although the subject regained partial consciousness it was several hours before the stupor had worn off completely. He recalled nothing after taking the drug, expressed his satisfaction at having had a restful sleep and proceeded to assist in washing the stools that he passed for the worms contained therein.

Comment

Both of these cases presented what appeared to be the action of a general anesthetic akin to ethylene or chloroform. They obviously indicate the need for hospitalizing or otherwise keeping under close surveillance all patients who are treated with tetrachlorethylene even in doses smaller than are usual. While for want of a better drug they should not discourage the use of tetrachlorethylene they illustrate the truth of a remark which the late Dr. Maurice Hall made to me to the effect that one cannot assume that any anthelmintic is entirely safe for human use until there are reliable reports on at least a million treatments without any untoward effects.

C. L.

PARACIOS (J. Valencia) La estadística en la clínica de la Schistosomiasis mansoni digestiva. [Statistics of *S. mansoni* Infection of the Bowel.]—*Gac Med de Caracas* 1941 Jan 31 & Feb 15 Vol 48 Nos. 2 & 3 pp 191-194 196-200

BLUMPT (E.) Observations biologiques diverses concernant *Planorbis* (*Australorbis*) *glabratus* hôte intermédiaire de *Schistosoma mansoni*. [Biology of *P. glabratus*].—*Ann Parasit Humaine et Comparée* 1941 Vol 18. No 1-2-3 pp 9-45 With 7 figs. & 1 plate. [57 refs.]

Mansonian schistosomiasis may be prevented—(1) by stopping promiscuous defaecation which may infect snails a measure that has proved unpracticable (2) by treatment of infected men disappointing in practice (3) by getting rid of the snail intermediary. To do the last satisfactorily in Venezuela the biology of *P. (A.) glabratus* must be known and the paper records observations on this point.

This snail is widespread in South America. If the vegetation to which it is attached is agitated it rapidly floats and its presence in any stretch of water is disclosed, experiment in a tub showing that 70 per cent. of the snails float in this way. The addition of one part of sea water to three parts of fresh is fatal to this *Planorbis* even if the

addition is slowly made but in the weaker mixture of one of sea water to four of fresh water they can live for 35 days though they neither feed nor oviposit yet if taken from the stronger solution when seemingly at the point of death they appear to become normal in about a fortnight. At 25°C. hatching takes place about 10 days or a little later after oviposition the young live first on microscopic fauna and flora and then collect on any lettuce leaves placed at their disposal. Development is quicker in ample water thus when kept singly in 80 cc of water they began to oviposit on the forty-sixth day when 274 were put in three litres of water (11 cc. per head) development was much slowed the surface area is held to be of little importance here. At 25°C they produce six generations yearly and this is their probable rate of reproduction in tropical countries.

Probably not more than 20 000 to 25 000 of the local inhabitants of Venezuela are infected though the local percentage of infection of *P. glabratus* in nature may be as high as 100 Brumpt corrects his statement [this *Bulletin* 1941 Vol 38 p 41] that the tentacular lesions there pictured had not been reported before they were described by GORDON DAVEY and PEASTON for *S. mansoni* in *Planorbis pfeifferi* in Sierra Leone [this *Bulletin* 1935 Vol. 32 p 237]

These considerations applied to prophylaxis lead to the following advice. Useless collections of water should be pumped empty. Irrigation and drainage canals should be regularized or better still replaced by cement drains. Satisfactory collections of snails by hand will be hard to effect. Seawater in a strength of 35 to 40 per cent maintained for several days destroys the snails. If need for economy allows sulphate or carbonate of copper quicklime or sulphate of ammonia may be used for this purpose. The planting beside open water of acclimatized *Balanites aegyptiaca* merits trial. Animal enemies of the snail are considered including the small *Helobdella* leaches which though rarely are found in collected snails similarly certain water insects attack this *Planorbis* but are too rare in nature to be effective in destruction and probably cannot be increased in numbers nor is there any parasite known to castrate *Planorbis* as does a parasite of the duck so destroy *Bithynia* which is the intermediate host of *Clonorchis sinensis* C. L.

MEIRA (João Alves) Considerações sobre os aspectos retosigmoidoscópicos e os quadros radiológicos do grosso intestino na esquistossomíase mansoni (Doença de Manson Pirajá da Silva) [Rectosigmoidoscopy and Radiology of the Large Intestine in Mansonian Schistosomiasis].—*Ann Paulist Med e Cirurg* 1941 Apr & May Vol 41 Nos 4 & 5 pp 317-24 327-30 333-4 337-44 389-90 393-4 397-412 415-26 [31 refs] With 19 figs English summary

Of the 36 cases dealt with both methods of examination were carried out in 19

To the sigmoidoscope conditions were normal throughout the visible parts in 4 in 3 there was catarrh of the rectum extending to the sigmoid in 9 there were granulations and hypertrophy and in 2 there was ulceration in 1 the proctitis was atrophic in 2 erosive and in 2 there was diffuse congestion condylomata prolapse and fistula were each present in 1 and in 2 piles

The X-rays showed normal condition in 3 insufficiency of the ileocaecal valve in 11 signs of colitis through the whole length in 5 in the ascending transverse and descending colon in 2, 5 and 7 and in the sigmoid in 1—with overlapping in one a tumour pressed on the caecum in none were polypi seen.

No lesion was diagnostically specific. In all the diagnosis was established by microscopic examination of the faeces a procedure that should on no account be omitted

C. L.

CALDAS (José Mario) Schistosomose em proctologia. [Schistosomiasis of the Rectum].—*Brasil Medico* 1940 Aug 10 Vol. 54 No 32 pp 553-558 With 2 figs.

A pedunculated tumour with a wide base sprang from the anterior wall of the rectum 3 cm from the anus it had mainly a smooth surface but at one spot an ulceration covered with bloody pus.

After its removal sectioning disclosed no evidence of malignancy but there were in it granulomata made up of lymphocytes plasma cells epithelioid cells and eosinophils and having in their central part foreign-body giant cell surrounding a structure with the character of a schistosome egg. There is no mention of examination of the faeces before or after operation for these eggs, but Caldas urges his fellows to do so in suspicious cases in the Federal district

C. L.

MAGALHÃES (Aggen) & COELHO (Barros) Cancer in Schistosomiasis.—*Bahia Medica*. Brazil 1941 Jan & Feb Vol. 12 p 7 [Summarized in *Jl Amer Med Assoc* 1941 Sept. 20 Vol. 117 No 12 p 1049]

"Aggen Magalhães and Barros Coelho found among 2,014 necropsies in the Department of Pathologic Anatomy of Recife histories of 8 cases of liver cirrhosis with primary cancer. In 5 of these *Schistosoma mansoni* was present. The eggs of the parasites were encysted by the connective tissue in the portal spaces and did not come in contact with liver cells or with the tumor cells. The authors believe that the toxins of *Schistosoma mansoni* and not the parasite exert a cancerogenic effect in persons with predisposition to cancer. The virulence of the toxins depends on the thickness of the connective tissue capsule about the eggs. Primary cancer of the liver combined with cirrhosis and schistosomiasis is due to the toxins of *Schistosoma* which reach the liver by way of the portal blood. It is not dependent on the cirrhosis. Rectal schistosomiasis combined with rectal cancer is rare. Benign rectal tumors may develop from rectal schistosomiasis because the eggs stimulate an energetic connective tissue reaction causing the eggs to become encysted and the virulence of the toxins of the parasite to be greatly diminished.

GELFAND (Michael) A Note on the Clinical Features of Bilharzia Salpingitis.—*South African Med Jl* 1941 Feb 22 Vol 15 No 4. pp 69-70

A study of two cases in which the uterine adnexa were involved, removed at laparotomy and bilharzial infection proved by the microscope. The symptoms suggesting diagnosis before operation are considered.

In one woman the right tube was grossly diseased and was removed, the left tube showed a few tubercles on its serous coat the ovaries and uterus appeared normal microscopic examination of the right tube showed bilharzial ova the faeces were then examined and found to contain ova of *S. mansoni* a thorough course of antimony was given and later she became pregnant In the second woman the right tube had much the appearance of that in the first while the left looked normal The common symptoms have been pain in the lower abdomen tenderness in the iliac fossa a tender mass in Douglas's pouch no leucorrhoea no cervical erosion and little menstrual disturbance

C L

CAWSTON (F Gordon) The Modern Treatment of Bilharzia Disease
—*South African Med J* 1941 Sept. 13 Vol 15 No 17 pp 337-338

MOZLEY (Alan) Malachite in the Control of Bilharzia. [Memoranda]
—*Brit Med J* 1941 Oct 11 p 511

In an investigation into the possibility of the control of bilharzia in S Rhodesia an essential feature has been the search for a practical means of controlling the intermediate hosts *Physopsis globosa* and *Biomphalaria pfeifferi* Copper sulphate is relatively toxic to man and animals copper carbonate less soluble than copper sulphate but as effective is less toxic but expensive The author has found that malachite (mineralized basic copper carbonate) ground and passed through a 200-mesh sieve is suitable and yields an effective concentration of 0.5 part of copper per million in natural water It destroys the snails in the laboratory and in the field. The solubility is increased by mixing with fresh brewer's waste or the powdered pods of a common Rhodesian tree, *Swartzia madagascariensis* Malachite is found in S Rhodesia and the present cost is less than £1 a ton

C H

ROBERTSON (R. Cecil) Schistosomiasis in the Tai-Fu Region of Yunnan Province.—*J Trop Med & Hyg* 1941 Mar 15 Vol 44 No 6 pp 35-38. With 2 figs. [17 refs.]

This paper was originally published in the *Chinese Med J* 1940 Apr Vol. 57 No 4 p 358 see this *Bulletin* 1941 Vol 38 p 42.

VITUG (Wenceslao) CRUZ (Jose R.) & BAUTISTA (Laureano D) Schistosomiasis Involving the Brain Two Case Reports.—*J Philippine Med Assoc* 1941 June Vol 21 No 6 pp 291-293 With 2 figs on 1 plate

In Case 1 the condition was verified at autopsy in Case 2 the diagnosis was a reasonable inference the symptoms being the same and cure taking place under founadin treatment. These appear to be the third and fourth instances in which the diagnosis was made in the Philippines

Case 1 In a man of 20 years of age convulsive seizures began to come on suddenly each lasting 5 to 45 seconds with unconsciousness

he developed paresis of the left lower and right upper extremities there was retraction of the head the mouth was drawn to one side. He died in one of these fits 12 days after they began. Eggs of *Schistosoma japonicum* were present in ulcer of the colon and in its serosa, in the liver lungs and brain. As to the last they were seen in the thickened pia-arachnoid and in the cortex and white matter below it while the choroid plexus of the left lateral ventricle had many capillaries plugged with the ova. The other organs were normal to naked eye and microscope.

Case 2. A man of 49 had ailed for a year with numbness and weakness then, abruptly tremors spasmodic contractions and paresis set in in all extremities breathing became difficult and he could no longer walk. Examination showed a large liver and hemi-anaesthesia and hemiparesis of the right side. The faeces contained eggs of schistosomes *Ascaris* and *Trichuris*. He had two courses of Fuadin injection and saturated solution of potassium iodide galvano-faradic therapy and chenopodium.

During the first week of his stay in the ward the patient had almost daily attacks of spasms of the muscles of the right side of the face and of the right upper and lower extremities and sometimes athetoid movements of the fingers. Subsequently these involuntary muscle contractions disappeared. Gradually he regained the strength of his right upper and lower extremities and the normal sensibility to different stimuli of the right side of his body returned. He was discharged strong and walking after about two months.

C. L.

MILLER (John E.) *Schistosoma Dermatitis as a Bathing Place Problem.*—*Amer Jl Public Health* 1941 Apr Vol 31 No 4 pp 305-309 With 1 fig

The assistant engineer of the Michigan Department of Health points out that this is not a new thing, having been known as weed itch at least as far back as lumbering days, and is no perquisite of Michigan. But there it is a nuisance that affects many who come to the beaches for summer bathing. The present method of prevention is to load on a boat a barrel containing a mixture of copper sulphate and copper carbonate dissolved in water and led through two hoses one running out on each side of a boat with their other ends trailing on the bottom. The fluid is siphoned out at a rate which will let a 60 gallon quantity containing 50 lb copper sulphate and 25 lb copper carbonate escape over an area of 25,000 sq feet of beach with infected snails. Relief from the itch was obtained at every beach so treated. Work is continued particularly with the aim of finding an easier simpler and cheaper way of killing the snails.

C. L.

WOOLFFY (E. J. S.) *A Case of Paragonimiasis.*—*Jl Roy Soc Med Ser* 1941 July Vol 27 No 3 pp 297-298.

A man who had served on the China station from 1931 to 1933 had severe haemoptysis in 1935 repeated at intervals since with small quantities of brown or blood stained mucoid sputum between. At Haalar it was found that *Paragonimus* ova were present in the sputum at those times only when there was definite haemoptysis.

C. L.

RO (Mantoku) & YOKOGAWA (Sadamu) Experimental Treatment of Paragonimiasis. Pathologic-Anatomical Observations of Dogs harbouring Lung Flukes (*Paragonimus westermani*) Experimentally Treated with Prontosil in Combination with Emetine Hydrochloride and especially, Histo-Pathological Changes in the Foel of Lungs and Changes in the Dying Flukes.—*Taiwan Igakkaï Zasshi* (Jl Med Assoc Formosa) 1941 Feb Vol 40 No 2. [In Japanese pp 268-304 [10 refs] With 24 figs. on 4 plates English summary pp 304-307]

This forms Part III of the paper recorded in this *Bulletin* 1941 Vol 38 p 47 and essentially concerns itself with the changes seen in worms killed by treatment and the tissue reactions in 3 dogs treated with a mixture of prontosil and emetine 3 others treated with emetine alone being controls.

The disappearance of eggs from the sputum was contemporaneous with the death and rapid disintegration of the flukes in the lungs and congestion bleeding and infiltration of the cyst wall especially by large mononuclears and polymorphs. In unsuccessful treatment with emetine alone or with the combined treatment these changes were absent. The first effects on the flukes were disintegration of ovary, testes and Mehlis gland but the vitellaria were over-active filling the uterus and breaking out into the excretory system and thus killing the worm. The explanation of the plates in English is full. C I

GALLIARD (H) & DANG-VAN NGU. Infestation de l'homme et du chien par *Fasciolopsis buski* au Tonkin [*F. buski* Infection of Man and Dog in Tonking]—*Rev. Méd. Française d'Extrême Orient* 1941 Jan-Feb No 1-2 pp 31-37 [13 refs]

In the last 18 months infection of man with *F. buski* has been found five times in Tonking. In the stools eggs were found once and the worms were then recovered from the faeces after chenopodium yet in none of 10 000 local faecal examinations have these large and conspicuous eggs been reported. On three occasions the fluke has been found at autopsy and on one it escaped on incising the intestine for a gastro-enterostomy. All specimens were mature and it seems that their eggs should be found in the stools. On the other hand in Cochin China the fluke was found in 1908 and 1910 but not since. It is present in from 6 to 47 per cent of pigs according to season. Morphology has given no grounds for believing that there is more than one species in these different hosts. In the Delta the differences in distribution between man and pig are attributable to their different feeding habits. *Pontederia* (*Eichhornia*) *crassipes* the plant on which the metacercariae settle is given to pigs raw the much rarer fruit of *Trappa natans* is eaten by man only after cooking.

In the dog it has been found in Tonking once naturally—in the stomach. Experimentally two dogs were given flukes by mouth 15 to each dog. No flukes were found in the intestine when they were killed 10 and 72 hours later nor had any eggs appeared in the faeces while the dogs lived. A third dog was given 20 by mouth 18 hours later one was found 2 cm below the pylorus and there had been eggs in the faeces. Into a fourth and fifth dog flukes were introduced into the small intestine by laparotomy five into each dog into the fourth they were put in 35 cm below the pylorus and four days later

three were alive and lively sited 10-30 and 90 cm. from the pylorus, and eggs had been present throughout—in the fifth the bowel was opened 50 cm. above the caecum, and three days later all had disappeared from the intestine and no eggs had meanwhile been seen in the faeces. C. L.

UNANUE (Emilio) & LEÓN (Francisco) Dos casos de *Fasciola hepatica* [Two Cases of *F. hepatica* Infection.]—*Rev. Med. Trop. y Parasit.* Habana. 1941 Jan.-Apr. Vol. 7 No. 1 & 2. pp. 3-4 With 2 figs.

Eggs of *F. hepatica* were found in the faeces of two patients. For reasons beyond the authors' control the description of one of them is not given. The other was a woman of 29 with obscure abdominal pains particularly in the right hypochondrium and the iliac fossae (her appendix had already been removed). Red cells numbered 4 450 000 haemoglobin 80 eosinophils 1—eggs were recovered by means of the duodenal sound. Under emetine treatments these eggs appeared to become degenerate but details of the treatment are not given. C. L.

SHAW (G. W. B.) & CLYNE (A. J.) A Case of Infection with *Fasciola hepatica*.—*Jl. Roy. Army Med. Corps* 1941 Mar. Vol. 78. No. 3 pp. 173-174.

A small painful moveable nodule over the seventh rib in the right anterior axillary line proved to contain a *Fasciola hepatica*.

After living 20 years in Switzerland and 10 in India a woman came to hospital for vague abdominal pain chiefly right-sided. Within nine months she had been in hospital for bacilluria, appendicectomy and myalgia. This time she had a temperature of 99.4°F and the nodule was discovered—stool examination disclosed no ova or cysts. The Wassermann reaction was + the Kahn —. On excision of the nodule the fluke was found in it, surrounded by inflamed subcutaneous tissue but no track ran to deeper structures. It is given as an interesting feature that there had been migration from the liver through the diaphragm and chest wall to the subcutaneous tissue. [It seems, however likely that as is not unusual, the cercaria strayed in a non-optimum host and became detained on the spot where it was later found having never reached the liver.] C. L.

BRUCKMANN (Justus) Cólicos biliares originados por *Fasciola hepatica*.—[Biliary Colic caused by *Fasciola hepatica*.]—*Semin. Med.* 1941 Jan. 18 Vol. 48 No. 3 pp. 159-161 With 1 fig.

BOONE (C.) Echinostomiasis aan het Lindoerneer in Centraal-Celebes. [Echinostoma Infection at Lake Lindoe, Celebes.]—*Geneesk. Tijdschr. v. Nederl. Indië* 1941 May 27 Vol. 81 No. 21 pp. 1139-1167 With 1 fig. English summary.

"Echinostomiasis at Lake Lindoe in Central Celebes was re-investigated by the author during a short visit in 1940. The results were as follows:

"1 The observations by BOONE and SANDGROUND in 1939 of a special density of infection of the mussel *Corbicula lindoenis* with metacercariae of echinostomes at spots near the human habitations on the shore of the lake could be confirmed. An average infection density

of 74 echinostome-metacercariae per mussel at Antja plage contrasted with a minimum of 0.6 metacercariae per mussel in remote places.

2 Parallel to this difference in infection rate of the second intermediate host goes a similar difference of infection density of the first intermediate host *Anisus sarasinorum*. At Antja plage 20 per cent of the *Anisus* harbour rediae and cercariae in remote places no infection was found in 268 *Anisus*.

3 The infection density of *Corb linduensis* can be increased from 0.6 to 18 metacercariae per mussel by contact with *Anisus sarasinorum* from Antja plage.

4 On the Celebes coast lives a freshwater mussel much resembling *Corb javanica* from Java. It has been identified by BEQUAERT as *Corb celebensis* v. Mart. With regard to echinostome infections *Corb celebensis* behaves like *Corb javanensis* which is only very rarely found infected in nature. At Paloe near the coast no infections at all were found in *Corb celebensis*. Exposure of these entirely negative *Corb celebensis* to the cercariae of *Anisus sarasinorum* from Antja plage caused an infection with echinostome metacercariae averaging 5 metacercariae per mussel.

5 Simultaneous exposure of *Corb linduensis* and *celebensis* to echinostome cercariae (with fluted tail) of *Anisus sarasinorum* reveals a distinct preference of these cercariae for *Corb linduensis*. In one experiment in which 18 cercariae were brought together with two mussels, a single specimen of each species 13 cercariae were found back as metacercariae in *C. linduensis* and only one in *C. celebensis*.

6 Feeding to animals of Lindoe-mussels leads to the development of two species of echinostomes: one species with 37 and one species with 45 oral collar spines. In pigeons and ducks the species with 37 spines develops in rats and mice both species develop. These experimental infections are very irregular and often transient. They may occasionally die out before the worms become sexually mature and start to produce eggs.

No definite results were obtained by feeding experimentally infected mussels to laboratory animals.

7 One cannot with certainty differentiate metacercariae with 37 from those with 45 spines in routine work.

8 The experimentally obtained echinostomes with 37 spines resemble *E. linduensis* Sandground and Bonne from man. The species with 45 spines resembles *E. murinum* Tubangu from the rat. There are differences however between this species and the species from the field rats in Java with 45 spines which also resembles *E. murinum*. The spines of the Java species are irregular in size and some of them are very large (28-75 μ) the spines of the Celebes species are more uniform (35-45 μ). The eggs of the Celebes species are thicker (about 62 μ) than the eggs of the Java species (about 56 μ). It is not clear yet whether the Celebes or the Java species must be considered identical with *E. murinum*.

9 Man is more readily infected with *E. linduensis* by eating Lindoe-lake mussels than any laboratory animal investigated (rat, mouse, chicken, duck, pigeon, monkey). An ideal adaptation exists between man, mussel and echinostome.

10 This difference in behaviour makes identity of *E. linduensis* with *E. revolutum* a natural parasite of ducks improbable notwithstanding their morphological resemblance. A dozen wild ducks from the lake were examined for echinostomes with negative results.

11 The two types of echinostome metacercariae with 37 and 45 spines respectively are present in the mussels at all points of the lake-shore investigated even at the spots with a minimal density of infection.

12. The infection of the mussels with metacercariae of *E. lindoei* all round the lake can probably be completely explained by the presence of the three human foci of infection the three Toradja villages on the lake-shore. No reservoir host has been discovered. For the infection with metacercariae with 45 spines some animal host must exist as this species has not been found in man. Rats were negative but only few specimens were captured and examined.

13 Certain species of snails *Viviparus javanicus rudipellis*, *Bulinus ovalinus*, *Pila conica* and *Anisus sarasinorum* also harbour echinostome metacercariae. Whether they represent metacercariae of *E. lindoei* or the species with 45 spines has not been completely worked out. These snails have no importance for the human infections, because they are not eaten.

"*Anisus sarasinorum* is the only snail in Lake Lindoe known to send out echinostome cercariae.

14 Uninfected *Lymnaea rubiginosa* and *Viviparus javanicus* brought from Java became carriers of echinostome metacercariae through contact with *Anisus sarasinorum* from Antja plage.

From these experimentally obtained *Viviparus* metacercariae echinostomes with 37 spines developed in mice from a heavily infected *Lymnaea* only a few echinostomes with 45 spines developed in a rat whereas a human volunteer promptly obtained a solid infection by eating one of these *Lymnaea*. This was probably a *lindoei* infection.

Apparently *Anisus* sheds the cercariae of both species. This experiment also proves directly that a human infection can develop from *Anisus* cercariae through a suitable second intermediate host. This same conclusion was drawn indirectly from the observations regarding the infection densities of *Anisus* and *Corbicula* along the shores of lake Lindoe where the mussel *Corbicula* acts as second intermediate host.

GALLIARD (H) & V NGU (D) Quelques trématodes parasites des animaux domestiques au Tonkin. [Trematodes of Domestic Animals in Tonking. — *Rev Méd Française d'Extrême-Orient* 1940 Mar No 3 pp 131-134]

MALARIA

MAPLESTONE (P A) Some Aspects of Two Common Tropical Diseases. — *Med J Australia* 1941 Mar 29 28th Year Vol 1 No 13 pp 377-380

In this paper the author discusses malaria and its treatment and amoebic dysentery. No new work is presented but the paper is a good résumé of modern practice. C IV

ARCHETTI (Italo) Presenza di *Plasmodium malariae* nella regione fra Sagan e Omo (A O I) [Presence of *P. malariae* in the Valleys of the Sagan and Lower Omo (Southern Abyssinia)]—*Riv. di Malariaologia* Sez. I 1940 Vol 19 No 6. pp 370-373 With 1 map [16 refs] German summary (4 lines)

The observations recorded were made in Gondaraba (515 metres) in the valley of the Sagan River just north of Lake Stefania and in Elolo and Nargi (500 metres) close to the northern end of Lake Rudolph. In all three places children for the most part between 1 and 12 years of age were examined. In Gondaraba of 95 children 33 were infected with malaria of these two harboured *P. malariae*. One *P. malariae* infection was noted among ten children examined in Elolo. In Nargi 60 children were examined 18 harboured malaria parasites of whom 10 had *P. malariae* infections. No local *P. vivax* infections were seen. *A. gambiae* and *A. pharocensis* were found.

Norman White

VAN ROOYEN (C. A.) Observation of Malaria Parasites in Fresh Blood Films. [Memoranda]—*Brit. Med. J.* 1941 July 19 p 87

When fresh blood is sealed beneath a cover slip changes occur which are not obtainable when blood is smeared directly it is shed. The author describes the appearances seen when after three to five minutes under a cover-slip the blood containing crescents was stained. One crescent was partly engulfed by a leucocyte. When a crescent is approached by a leucocyte in living blood it performs gyroscopic movements and the granules of pigment are scattered to the periphery. In a specimen stained after five minutes under a cover-slip a similar object was stained and appeared to be one of these rotating bodies caught at a lucky moment. C W

FIELD (J W) Further Note on a Method of staining Malarial Parasites in Thick Blood Films.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941 July 3 Vol 35 No 1 pp 35-42. With 12 figs on 3 plates

In an earlier paper [this *Bulletin* 1940 Vol 37 pp 874-5] the author described a rapid method of staining thick blood films for malarial diagnosis the stain used being brilliant cresyl blue. Though the method has given fairly satisfactory results further experimentation has given a still better method in which Azure I or methylene azure is employed. The staining is carried out with two solutions A and B

Solution (A)	Methylene blue	0.8 gramme
	Azure I	0.5
	Disodium hydrogen phosphate (anhydrous)	5.0
	Potassium dihydrogen phosphate (anhydrous)	6.25
	Distilled water	500 cc
Solution (B)	Eosin	1.0 gramme
	Disodium hydrogen phosphate (anhydrous)	5.0
	Potassium dihydrogen phosphate (anhydrous)	6.25
	Distilled water	500 cc

"The phosphate salts are first dissolved, then the stain is added. Solution of the granular Azure I is added by grinding in a mortar with a small quantity of the phosphate solvent. The solutions of stain should be set aside for 24 hours when, after filtration, they are ready for use. Should a scum later appear on the surface, or dye precipitate on the stained films, subsequent filtration is necessary.

"The same solution may be used continuously for many weeks without apparent deterioration but the coam solution should be renewed when it becomes greenish from the slight carry-over of the methylene blue.

"The stains are kept in covered jars of such a size that the depth of solution is about 3 inches the level being maintained by the addition of fresh stain as necessary."

The unfixed thick film, which should not be thicker than 10 to 15 times an ordinary thin film is dipped for one second in solution A. It is rinsed gently in clean water for a few seconds and then dipped in solution B for 1 second. It is again rinsed in clean water for two to three seconds and then placed vertically to drain and dry. It is then ready for examination. The staining is tri-chromatic with sharp colour contrasts between parasites and the ground of laked red cells on which they lie.

The paper discusses the principles of Romanowsky staining as applied to the method and describes with the aid of a series of microphotographs many of the appearances of cells and parasites stained by it.

C. M. Wernon

VORONHA (A. J.) On the Occurrence of Atypical Gametocytes in the Blood-Smears of a Recently Investigated Case of Malaria.—*J. Trop. Med. & Hyg.* 1941 June 16. Vol 44 No 12 pp 73-6 With 10 figs

The paper which is illustrated by a series of microphotographs describes a case of mixed *Plasmodium falciparum* and *P. malariae* infection in which the gametocytes of the malignant malarial parasite showed certain peculiarities. No typical crescents were present, but the female forms were straight and shaped like a rice grain or still more elongated with pointed extremities while the male forms were of a stumpy oval shape. It is thought that the unusual appearance of the gametocytes may have been the result of the particularly heavy infection, which had caused the death of the patient, or to all the crescents being in an immature condition.

C. M. W.

BROVOMINI (Gimbo) Anofelismo e bonifiche. Studi sulla fauna anofelica dei Consorzi di Bonifica del basso Volturno (Napoli) [Anophellism and Bonification. Studies of the Anopheline Fauna in the Region of the Lower Volturno (Naples) undergoing Bonification.—*Riv. di Malariologia* Sez. I. 1940 Vol 19 No. 3 pp 130-145 With 1 map & 2 graphs English summary (8 lines)]

The observations recorded in this paper were carried out from July 1937 to November 1938 in an area of some 220 square kilometres lying on both sides of the lower reaches of the River Volturno to the north of Naples. The population of the area is 23,500. Bonification is in progress at the time of the investigation this had reached varying stages of development in different parts of the area. Five varieties of *A. maculipennis* were found, typical *melanoon* *miriscae* *lafranckiae*

and *clutus*. The last two *labbranchiae* and *clutus* are the most important vectors their relative prevalence diminishes with the progress of bonification. A study of endemic malaria was made in Castelvolturno situated on the left bank of the mouth of the river. Here the maximum incidence of malaria occurred a month later than the maximum prevalence of anophelines. Anophelines were not very numerous but 4 *m labbranchiae* and *clutus* constituted 73 per cent of *Anopheles* with mature ova caught in human habitations. Man was found to have very little attraction for 4 *m messeae* and *melanoon*. *A m typicus* was commonly found in human dwellings. N W

D JESUS (P I) Physicochemical Factors affecting the Breeding of *Anopheles minimus* var *flavirostris*—*Acta Med Philippina* 1941 Jan-Mar Vol 2 No 3 pp 333-340 [18 refs]

The author has made observations on the distribution of larvae of *A minimus* var *flavirostris* in waters in Laguna Province Philippine Islands. He studied a length of stream and a group of wells in parts of the stream and some of the wells the insect was consistently present in others absent.

As the result of a large number of analyses for 11 chemical factors it is concluded that (in this area) the larvae were found where carbon dioxide and nitrate were low and oxygen high. This was true of both types of environment the difference in oxygen tension being particularly well marked in the wells as the following figures (in parts p m) show —

	Stream	Wells
Positive for <i>minimus</i>	5.78	2.93
Negative ..	4.37	1.02
Difference	1.41 ± 0.193	1.91 ± 0.183

The author concludes that oxygen was a very significant factor affecting the breeding of *A minimus* [but this does not necessarily follow from his observations for it may well be that a high oxygen value is associated with some other factor which is the effective one]

P A Burton

BIANCHI (Carlo) Contributo allo studio delle sindromi anemiche post malariche [Contribution to the Study of the Post-Malaria Anaemic Syndrome]—*Riv di Malarologia* Sez. I 1940 Vol. 19 Nos 4 5 & 6 pp 234-250 318-335 374-386 With 15 figs [58 refs]

This is a long and detailed account of a painstaking investigation of malarial anaemia carried out in Sassari Sardinia where the author had an abundance of clinical material. The results of the study of 45 patients are given. Twelve of these were sufferers from acute malaria all of whom harboured malaria parasites in the peripheral blood or in the bone marrow or in both. In a second group were 16 patients who suffered either from chronic malaria or from a primary infection but in whom there had been freedom from acute febrile manifestations of the disease for some little time. A third group comprised 17 sufferers from chronic malaria who had not for a long time suffered any acute febrile attacks. A haemometric study was made of each patient and a sternal puncture was made in each case.

Some patients were also submitted to hepatic puncture. The findings of all cases are tabulated and numerous microphotographs amplify the text. The author summarizes his findings as follows —

Post malarial anaemia is the expression of pathological changes in the bone-marrow directly attributable to the infection. These changes provide a macro-megalo-cytic anaemia, with a marked degree of reticulo-cytosis and neutropenia. There are peripheral signs of reticulo-endothelial stimulation. Anatomopathologically it is characterized by an erythroblastic hyperplasia with frequent evidence of abnormal cell development and the presence of atypical forms (megalo-blasts with mis-shapen nuclei and of abnormal size) signs that the erythroblasts are derived from histiocytes.

"The fundamental erythroblastic hyperplasia is constantly associated with a hypoplasia of the haematoblasts (cellule staminali) a hyperplasia of the cells of the reticulo-endothelial system, a hypoplasia of granulocytes and an abundance of plasma-cells and lymphocytes.

Discussing opinions formerly held with regard to the significance of the marked changes constantly seen in the bone-marrow of acute and chronic malaria cases the author considers the involvement of the bone-marrow to be the predominant pathogenic factor in the production of the anaemia. Other factors such as a humoral-splenic inhibition of medullary function, haemolysis, constitution possible food deficiency etc. are of the secondary importance as pathological factors. There is a pathogenic affinity between post-malarial anaemia and the anaemias of cytogenic dysfunction.

V II

HOCH (Paul) KUSCH (Ernest) & COGGESHALL (L. T.) The Treatment of General Parasitis with Malaria Induced by Injecting a Standard Small Number of Parasites.—*Amer Jl Perchiatry* 1940 Sept. Vol 87 No 2 pp 297-307

The induction of malaria by direct inoculation of infected blood is simpler than the natural method of infection, but infections so induced are extremely varied sometimes early severity necessitates interruption sometimes spontaneous recovery occurs before the patient has earned appreciable therapeutic benefit. Such considerations prompted inquiry into how far the variable number of parasites in the inoculum responsible for the variable results. Thirty two patients were inoculated with a calculated small number of parasitized red-cells none received more than 1000 trophozoites. The McCoy strain of *P. vivax* was used throughout.

A thin blood-smear from the donor patient was made. If parasites were present as young ring forms parasite and red cell counts were made. One cc of infected blood was then drawn and mixed with heparin granules. This sample was diluted with citrated normal blood so that 1 cc of the mixture contained a million parasites. Further dilutions were then made so that 1 cc. contained 1,000 500 250 or 100 parasites as required. All inoculations were given intravenously. Some patients received a calculated dose of one parasite.

There was a relationship between the dose and the incubation period but the character of the infection, once established, was independent of the infecting dose. Small standardized doses of parasites gave more uniform results than the artificial methods generally used and usually better therapeutic results were obtained. An extremely small number of trophozoites of the strain used, between 100 and 250 is sufficient to induce infection.

V II

MOLLARET (P) Le problème de l'absence de toute période d'incubation dans l'impaludation artificielle par injection directe de sang [The Problem of the Total Absence of an Incubation Period of Malaria transmitted by the Inoculation of Blood.]—*Bull Soc Path Exot* 1940 Vol 34 Nos 1-3 pp 62-80 With 7 figs. [25 refs]

In the author's malaria therapy practice infection is transmitted by infected blood taken from the donor and injected immediately into a number of patients awaiting treatment. No anticoagulant is required and the syringe is of sufficient capacity for the series of patients who have been previously prepared. The usual dose of infected blood is 5 cc. it is generally given intramuscularly, occasionally intravenously.

During an experience of more than ten years with the same strain of *P. vivax* occasional cases have been observed in which no incubation period preceded the onset of malarial paroxysms. Such cases have been extremely rare. The two cases now reported present unusual and interesting features.

Two men each received 5 cc. of infected blood from the same syringe (one intramuscularly, the other intravenously). The day following the inoculations was uneventful. On the third day both patients simultaneously suffered from typical malaria paroxysms at the same time as the donor was suffering from his tenth and last paroxysm. The temperature curves of the three men, donor and recipients for this day, can be almost superimposed. The recipient who was inoculated intramuscularly had never had malaria; the other had been subjected to a course of malaria therapy two years previously. Blood from these anomalous cases inoculated into other patients produced infections after normal incubation periods, as did the blood of the original donor taken the day after the withdrawal of blood which produced the anomalous attacks.

The author discusses at length similar cases that have been reported in the literature and the possible causes of an unusual phenomenon.

A II

WAR OFFICE Notes on the Treatment of Malaria occurring in Individuals returning from Service in Malarious Areas—8 pp 1941 June 30 London HMSO [1d.]

In the introduction it is pointed out that cases of malaria may be expected in men who return to Britain from service overseas in malarious countries and that a high proportion of those seen have been suffering from the dangerous malignant tertian variety. The standard Army treatment is as follows—

Days 1 and 2 —

Quinine bisulphate or Quinine hydrochloride grains 10 in solution in one fluid ounce of water by mouth three times in 24 hours.

Days 3 4 5 6 and 7 —

Mepacrine hydrochloride 0.1 gramme tablet three times a day swallowed whole with a draught of water after food.

Days 8 and 9 —

No anti-malarial drug treatment

MOLLARET (P) Le problème de l'absence de toute période d'incubation dans l'impaludation artificielle par injection directe de sang [The Problem of the Total Absence of an Incubation Period of Malaria transmitted by the Inoculation of Blood.]—*Bull Soc Path Exot* 1940 Vol. 34 Nos 1-3 pp 62-80 With 7 figs. [25 refs]

In the author's malaria therapy practice infection is transmitted by infected blood taken from the donor and injected immediately into a number of patients awaiting treatment. No anticoagulant is required and the syringe is of sufficient capacity for the series of patients who have been previously prepared. The usual dose of infected blood is 5 cc. it is generally given intramuscularly, occasionally intravenously.

During an experience of more than ten years with the same strain of *P. vivax* occasional cases have been observed in which no incubation period preceded the onset of malarial paroxysms. Such cases have been extremely rare. The two cases now reported present unusual and interesting features.

Two men each received 5 cc. of infected blood from the same syringe, one intramuscularly, the other intravenously. The day following the inoculations was uneventful. On the third day both patients simultaneously suffered from typical malaria paroxysms at the same time as the donor was suffering from his tenth and last paroxysm. The temperature curves of the three men donor and recipients for this day can be almost superimposed. The recipient who was inoculated intramuscularly had never had malaria; the other had been subjected to a course of malaria therapy two years previously. Blood from these anomalous cases inoculated into other patients produced infections after normal incubation periods as did the blood of the original donor taken the day after the withdrawal of blood which produced the anomalous attacks.

The author discusses at length similar cases that have been reported in the literature and the possible causes of an unusual phenomenon.

N II

WAR OFFICE Notes on the Treatment of Malaria occurring in Individuals returning from Service in Malarious Areas—6 pp 1941 June 30 London H.M.S.O. [1d.]

In the introduction it is pointed out that cases of malaria may be expected in men who return to Britain from service overseas in malarious countries and that a high proportion of those seen have been suffering from the dangerous malignant tertian variety. The standard Army treatment is as follows:—

Days 1 and 2 —

Quinine bisulphate or Quinine hydrochloride grains 10 in solution in one fluid ounce of water by mouth three times in 24 hours.

Days 3 4 5 6 and 7 —

Mepacrine hydrochloride 0.1 gramme tablet three times a day swallowed whole with a draught of water after food.

Days 8 and 9 —

No anti malarial drug treatment

BALLERO (Stefano) Il valore profilattico e terapeutico dell'adrenalina endovenosa nell'infezione malarica [Prophylactic and Therapeutic Value of Intravenous Injections of Adrenalin in Malaria Infections.]—*Riv di Malarologia* Sez. I 1940 Vol 19 No 6 pp 387-394 French summary

In Sassari Sardinia 89 individuals of a highly malarious community who were suffering from enlargement of the spleen or other manifestation of malaria were submitted to Ascoli's treatment during an inter-epidemic season. The adrenalin preparation used was surrenasin Serono [see this *Bulletin* 1941 Vol. 38 p 107]. A very marked improvement in the health of these patients was noted. There was a marked reduction in the size of the spleen in 74 per cent and a moderate reduction in 13 per cent of the cases. During the subsequent malaria season only 4.4 per cent of the treated suffered from malaria and they had but one attack each. Among the much larger untreated control population approximately 500 47.5 per cent suffered from malaria (averaging three attacks each or 143.9 per cent manifestations of malaria). The treatment was well tolerated by all several pregnant women were included in the treated group.

In addition during the epidemic season 42 persons suffering from attacks of malaria were treated in two neighbouring dispensaries by Ascoli's method. In 28 of these small doses of quinine supplemented the treatment. Good results were obtained with and without quinine alike. In 87.2 per cent of these patients there was a very marked reduction in the size of the spleen and a moderate reduction in the remaining 13 per cent. V II

BALLERO (Stefano) La terapia adrenalinica nella lotta contro la malaria in comprensorio di bonifica suoi risultati a distanza [Adrenalin Therapy in Anti-Malaria Campaign in a "Bonification" Area Durability of Its Results]—*Riv di Malarologia* Sez. I 1940 Vol. 19 No 6 pp 395-403 French summary (8 lines)

Malaria was extremely prevalent in a bonification area. Its population in 1936 was 457 in that year 449 malaria attacks were registered of which 94 were primary infections. The spleen index was 74 per cent. The usual antimalarial measures were ineffective. During 1937 250 persons were submitted to Ascoli's treatment this number represented 38.4 of the total population which had increased to 670. Seventy-two chronic afebrile cases were treated in May 98 febrile cases in July and 80 chronic cases during the last four months of the year. These persons were kept under observation till the end of 1939 they belonged to the same families as the 400 untreated persons who acted as a control. During the three epidemic seasons 1937-39 and the two intervening inter-epidemic seasons the total number of malaria cases recorded among the treated was 27. The number of cases among the untreated during the same period was 1730. These remarkable results testify to the durability of the refractory state conferred by Ascoli's treatment. In 97 per cent of the persons treated there was a

very marked improvement in general health and in capacity for work.
The economic value of the treatment in such conditions as these is stressed at some length.

EJECUTIVO (An omo) "Pampana Siphon" for Automatic Flushing of a Stream as a Naturalistic Method of Malaria Control. (Design L)—
Rr-4; Manzanilla Ser 1 1940 Vol 19 No. 6 Pp 345-389 With 1 sketch map 6 figs & 6 photos
Description of a series of three sump & automatic siphons of 171 and 49 metres which successfully control a small creek. The installation is composed of inlet and outlet iron pipes which traverse

This is a description of a series of three smug automatic siphons
 separated by distances of 171 and 49 metres with a successfully con-
 trolled anopheles breeding in a small creek. The installation is of a
 primitive kind. Each siphon consist of inlet and outlet iron pipes
 connected by elbow joint to a horizontal iron pipe which traverses the
 top of a dam. The dams were built as a construction of earth with bamboo
 and rustic support. It is the rustic construction of this flushing device as a
 to the author justifies the consideration of this flushing contention. The
 naturalistic method of malaria control—a curious contention. The
 author has named his contraption the Pampana Siphon as his "humble
 offering to honor Dr Emilio J Pampana, former secretary of the
 Malaria Commission of the League of Nations."

Kurt Walter & Morton Lilla - our parasitology Erkenntnisse - Light of New Knowledge in Parasitology - 1941 Jan 24 Vol 4 PP 85-89

Light of New Knowledge in Parasitology
1941 Jan 24 Vol 4 pp 85-89

The above is the 1st paper of our knowledge of the enemy
of our parasites - the malarial parasites. They show how the study
of malaria in general parasites and the failure of quinine to
even infection resulting from the infection of sporozoites led to the
discovery of the malarial parasites in cells other than red
blood corpuscles. It is interesting to note that some malarial
parasites are found in the liver, spleen, and other organs of the body.
The malarial parasites are found in the liver, spleen, and other organs of the body.
The malarial parasites are found in the liver, spleen, and other organs of the body.

- i. SCHULEMANN (W) & KNOCHE (E) Zum Problem der exo-erythrocytären Entwicklungsformen von *Plasmodium gallinaceum* I [The Problem of the Origin of the Exoerythrocytic Developmental Forms of *P. gallinaceum*]—*Arch f Experim Path u Pharm* 1941 Mar 31 Vol 197 No 3 pp 227-239 With 3 figs
- ii. KNOCHE (E) Zum Problem der exo-erythrocytären Entwicklungsformen von *Plasmodium gallinaceum* II—Ibid pp 240-251 With 7 figs (5 coloured)

i. In the first of these papers the authors describe experiments on the influence of blockage of the reticulo-endothelial system in *Plasmodium gallinaceum* infection in fowls

It is well known that an intravenous injection of trypan blue brings about blockage of the reticulo-endothelial system in mammals. If repeated injections are given not only is there a more intense blockage with particles of the dye but hypertrophy of the reticulo-endothelial system follows. Similar results have been shown to occur when colloidal solutions of palladium are injected. There is one difference however. Whereas the injection of the more diffusible dye leads to stimulation of the reticulo-endothelial system throughout the body the injection of the non-diffusible colloidal metal stimulates only the cells which occur in the vascular system. These results were obtained by experiments on mammals but it is shown in this paper that chickens respond in the same way affording an opportunity of studying the effects of the changes brought about in the reticulo-endothelial system on malarial infections in chickens.

Accordingly chickens which had been infected with *Plasmodium gallinaceum* were given intravenous injections of colloidal palladium at varying stages of the infection. When the injection is made at the height of the infection there is generally a fall in the number of parasites in the blood. If the injection is made earlier when parasites first appear in the blood then the resulting infection is less intense than it would otherwise have been. When the palladium injection is made before the infecting dose of malarial parasites is given the incubation period is increased. If at the commencement of the infection a series of palladium injections is begun not only is the blood infection reduced so that it disappears earlier than it does in untreated chickens but the number of exoerythrocytic schizonts is very greatly increased also. They appear in every organ of the body while in the brain they fill the blood vessels so completely that the organ is seriously damaged. Another feature of the infection in the treated chickens is that the anaemia at the height of the infection is less marked. Though in treated chickens the exoerythrocytic schizonts are produced in greater numbers they do not appear any earlier in the infection.

ii. In the second paper an account is given of experiments designed to explain the results described in the first paper. Chickens were similarly infected and treated and were examined post mortem at various stages of the infections. It is noted that not only do the palladium injections bring about hypertrophy of the reticulo-endothelial system but the phagocytic powers of the cells are much increased also. When chickens are infected and not treated with palladium there is some phagocytosis of infected red blood corpuscles. The majority of such phagocytosed cells with their included parasites are destroyed, but in a small number of cases the included parasites may survive and give rise to exoerythrocytic schizonts. As regards the unphagocytosed infected red

cells the parasites in them continue their development and produce the usual blood infection. In the case of the palladium treated chickens on account of the increased activity of the reticulo-endothelial system, the infected red cells are subjected to more intense phagocytosis. Larger numbers of phagocytosed parasites survive and develop into exoerythrocytic schizonts which are thus found in greater numbers than in untreated chickens. Furthermore the increased phagocytosis means that fewer infected red cells remain free to develop in the blood, so that the infection never reaches the intensity that it does in untreated chickens. C M II

ZAIN (H) Zum Ursprung der Endothelstadien des *Plasmodium gallinaceum* — On the Origin of the Endothelial Stages of *P. gallinaceum* — Arch f Experim Path u Pharm 1941 Feb 24 (Vol 197 No 2) pp 210-223

— Zur Entstehung der Endothelformen der Vogelmalaria (*Plasmodium gallinaceum*) — Klin Woch 1941 Feb 15 (Vol 20) No 7 pp 176-177 (11 refs)

It is generally recognized that exoerythrocytic schizonts in bird malaria (*Plasmodium gallinaceum*) develop directly from sporozoites but it is not so clear that they are able to arise from the pigmented erythrocytic forms of the parasites or the products of division of these the merozoites.

In these two papers the first being a preliminary note to the second, the author records the results of experiments and observations which were designed to answer this question.

If blood from an infected fowl is taken at the height of the infection and injected intramuscularly to another fowl parasites first appear in the blood in six to nine days and the height of the infection is reached on the tenth to the seventeenth day. The parasites in the blood then decrease in number till they disappear at about the twenty first day. If the brains of fowls are examined for exoerythrocytic schizonts it can be shown that as a rule none is present before the twenty first day after the inoculation. If infected blood is inoculated intravenously instead of intramuscularly the whole infection is hastened. Parasites appear in the brain almost at once while exoerythrocytic schizonts are found in the brain at a correspondingly early date. The interval between the first appearance of parasites in the blood and the first occurrence of exoerythrocytic schizonts in the brain is the same in the two cases. Citrated blood taken from fowls at the height of infection was centrifuged and it was found that the supernatant fluid was still infective when injected intramuscularly. If such supernatant fluid is passed through filters with pore measurements up to 2.27μ the filtrate is no longer infective. It seemed evident that the infective agents had been removed by the filter and that these must be some form larger than a merozoite which has a diameter of about 1μ . Examination of smears of the material held back by the filter showed, amongst other forms, a number of mature pigmented schizonts which had escaped from their erythrocytes and were ready for disruption into merozoites. It is concluded that these schizonts which fail to be removed from the citrated blood by centrifugation are responsible for the infectivity of the original supernatant fluid. As the infections caused by injection of supernatant fluid ultimately led to the development of exoerythrocytic schizonts in the brain it is held that the results obtained

afford proof of the origin of these schizonts from pigmented erythrocytic stages of the parasite. Furthermore it appears that fowls inoculated with blood taken from infected fowls when exoerythrocytic schizonts are present in the brain develop such schizonts earlier than fowls inoculated with blood taken from infected fowls before the schizonts had formed in the brain. The explanation of this is that when exoerythrocytic schizonts are present in the brain they not infrequently occur in the blood also and when such blood is inoculated to a fowl the schizonts lead to the earlier appearance of the same form in the brain. When blood which does not contain such forms is inoculated the resulting infection has to reach its height and subside before the exoerythrocytic schizonts are formed presumably from ordinary erythrocytic schizonts which have been phagocyted by cells of the reticulo-endothelial system.

C M II

VEZZOSO (Bartolomeo) L'immunità passiva nell'infezione da *Plasmodium gallinaceum*. Nota prima [Passive Immunity in *P. gallinaceum* Infection]—*Riv di Malarologia* Sez I 1940 Vol 19 No 3 pp 121-129 [18 refs] English summary (6 lines)

An attempt was made to influence *Plasmodium gallinaceum* infections in fowls by administering the serum of fowls which had recovered from the acute stage of infection with this parasite. In no case not even when the serum was given during the incubation period was there evidence that any degree of passive immunity had been conferred by intravenous or intraperitoneal injections of the supposed immune serum.

C M II

AFRICA (Candido M) DI (Francisco J) & SORIANO (Lily J) Further Studies on the Effect of Prontosil on Avian Malaria—*Acta Med Philippina* 1940 Oct-Dec Vol 2 No 2 pp 239-251 With 2 figs on 1 plate

In a previous paper [this *Bulletin* 1941 Vol 38 p 415] the authors showed that prontosil had a decided action in checking malarial infection in birds. In the present paper further experiments are described in which solutions of prontosil were administered daily to Java sparrows (*Padda oryzivora*) infected with *Plasmodium relictum*. The daily dose of 0.066 cc of 0.5 per cent solution was injected into the pectoral muscles. It was evident that this treatment cleared the blood of parasites for these could not be detected by blood examination or injection of blood into uninfected birds but that parasites had not disappeared entirely from the blood or organs was proved by the fact that relapse invariably occurred. These relapses took place even though the drug was administered for many days after parasites could no longer be detected in the blood. All the birds were treated for 82 days so that each received 5.4 cc of the 5 per cent solution. The definite action of the drug in the experiments reported is contrasted with COGGESHALL's failure to influence *P. lophurae* and *P. cathemerium* infections in birds with sulphanilamide and his marked success with *P. knowlesi* in monkeys (1 gramme by the mouth being sufficient to eradicate the infection entirely) and failure with *P. vivax* in man.

C M II

AMOEBIc DYSENTERY AND OTHER INTESTINAL PROTOZOAL INFECTIONS

SALIS (Herbert) Studies on the Morphology of the *E. histolytica*-like Amoebae found in Monkeys.—*Jl Parasitology* 1941 Aug Vol 27 No 4 pp 327-341 With 3 graphs & 19 figs on 2 plates [18 refs]

The careful examination and measurement of the entamoebae in stained films of faecal material from a number of different species of monkey have shown that two organisms of the *E. histolytica* type exist. In the one which gives rise to 4 nucleated cysts containing a small number of bar-like chromatoids and occasionally a glycogen vacuole the resemblance to *E. histolytica* is complete. In the other the mature cyst is unnucleated and contains, typically, numbers of small chromatoids of irregular shape. The nuclei have the same general structure as those of *E. histolytica* but are finer as regards the chromatin granules and the karyosome. Exceptionally cysts with two nuclei occur but these are regarded as supernucleated cysts, as in the case of cysts of *E. histolytica* and *E. coli* with more than four or eight nuclei respectively. Again as in the case of other entamoebae, distinct races with different average size of cysts occur.

This unnucleated *E. histolytica*-like entamoeba is identified as *E. chattroni* Swellengrebel 1914. It is noted that entamoebae of the same type have been described from ox, horse, sheep, goat, guinea pig. What evidence there is appears to indicate that *E. chattroni* is non-pathogenic. Two plates in black and white illustrate the two types of monkey entamoeba described. C. M. Wexson

REES (Charles W.) REARDON (Lucy V.) JACOBS (Leon) & JONES (Frances) Problems Encountered in the Growth of *Endamoeba histolytica* in Cultures Developed by Micro-Isolation.—*Amer Jl Trop Med* 1941 July Vol 21 No 4 pp. 567-578. [15 refs]

As a preliminary to attempts to cultivate *Endamoeba histolytica* in bacteria free media cysts obtained by a process of micro-isolation were freed from bacteria and planted on the medium of Boeck and Drbohlav previously inoculated with a pure culture of some bacterium. In this way cultures of *E. histolytica* with pure cultures of a number of different bacteria were obtained. When ten cysts only were planted in the medium previously inoculated with either *Bact coli* or a certain streptococcus (NIH 563) 20 per cent of the tubes containing the streptococcus yielded cultures of the entamoeba but none of the tubes containing *Bact coli*. When 25 cysts which did not stain with neutral red and could therefore be regarded as viable were inoculated to medium containing the streptococcus, as many as 80 per cent of the tubes yielded cultures of *E. histolytica*. Cysts left standing in normal saline solution and cysts washed with 1/5000 solution of mercuric chloride exhibited a lowered viability. Though cultures of amoebae with pure cultures of bacteria were readily obtained by inoculating media containing them with cysts from cultures or directly from fresh human stools, no growth was obtained when killed bacteria or tl

products of their disintegration were present instead of the living bacteria. The addition of other materials was also tried but in no case could a culture be obtained in the absence of living bacteria.

C M H

KARUNARATNE (W A E) *The Pathology of Amoebic Hepatitis including a Consideration of the Pathogenic Role of the Entamoeba histolytica* Parts I & II—*Jl Ceylon Branch Brit Med Assoc* 1940 Dec. Vol. 37 No 4 pp 213-254 With 12 figs on 3 plates [5 pages of refs] 1941 Mar Vol 38 No 1 pp 1-38 [8 pages of refs]

This monograph constitutes an extremely good review of the past literature of this subject. Readers are counselled to consult the historical aspects in the original.

P Manson Bahr

MANSION BAHR (Philip) *Amoebic Dysentery and its Effective Treatment. A Critical Study of 535 Cases*—*Brit Med Jl* 1941 Aug 23 pp 255-258 With 1 chart [19 refs]

This paper embodies a study conducted over a period of 20 years of 535 selected cases of amoebic dysentery in every one of which diagnosis was made certain by the demonstration of active *E. histolytica* or its cysts.

Four hundred and fifty were in males, 85 in females—all Europeans with the exception of 8 in Indian seamen. They hailed from 64 countries. Included was one indigenous case from New South Wales and one from the London docks.

Most cases originated between the ages of 20 and 40, there were 8 under 20, the youngest being 7½ though the infection had been acquired at 2 years of age. Twenty-six cases were diagnosed by the presence of *E. histolytica* in scrapings from ulcers in the rectum, 222 by active *E. histolytica* in the faeces and 287 by cysts or pre-cystic forms.

In no instance were active *E. histolytica* and its cysts found simultaneously in a blood and mucus stool.

Sigmoidoscopy was performed in 258 instances, amoebic ulcers and other characteristic lesions being found in 234, only in 9.3 per cent was the mucosa normal. Routine sigmoidoscopy is therefore of great value in diagnosis. From the large series it appears that amoebic dysentery is usually chronic and seldom dangerous to life. Thus there was only one death and the patient was moribund on admission to hospital. The great majority were apyrexial but fever usually denoting hepatitis was recorded in 30, there was however one case of amoebic fever simulating typhoid in intensity and clinical appearances. Diagnosis was rendered certain by sigmoidoscopy, no *E. histolytica* were ever demonstrated in the faeces of this patient. Acute cases with bloody diarrhoea and distressing symptoms were recorded only in 4, 244 could be classified as subacute and 287 as chronic. In 15 the chief complaint was chronic diarrhoea, 2.8 per cent were symptomless and classifiable as cyst carriers. The average duration prior to hospitalization was 4½ years, in 24 the disease had persisted for 16 years, only 4.7 per cent were seen in the first attack.

Enlargement of the liver was present in 76. The caecum and transverse colon were thickened in 128 but pericolic infiltration of the sigmoid colon was present in 212. Loss of weight is exceptional and was recorded in 61. Intermittent haemorrhages, with *E. histolytica* in the blood of the stools, were recorded in 4.

Localized deep abdominal tenderness over the caecum and sigmoid was most frequent (173) tenesmus rather rare (7) meteorism and flatulence as an outstanding feature occurred in 45 vomiting in 3 only. Solitary localized amoebic ulceration of the rectum resembling carcinoma was noted twice in both cases the condition had taken many years (10 and 21) to develop. Diagnosis was made certain by scrape preparations. Rectal prolapse due to amoebiasis occurred in 3 appendicitis (non-amoebic) in 5.4 per cent.

Latency is a curious feature of intestinal amoebiasis and in 11 cases silent periods of 11-22 years were registered. Sub-clinical cases are those with no definite signs, except perhaps muddy complexion, malaise fatigue and furred tongue. Diagnosis in the absence of faeces examination is impossible.

Treatment—Prior to coming under the author's treatment 48.5 per cent had undergone prolonged emetine therapy alone or combined with other drugs. These figures do not support the assumption that hypodermic injections of emetine as commonly supposed, are a certain cure. Indeed there is ample evidence that the practice of periodic emetine injections renders the *Entamoeba* emetine-fast and final cure more difficult. There were 7 cases of emetine intoxication in patients who had received 70-120 grains of the drug yet who continued to manifest active symptoms with parasitic relapses.

Emetine bismuth iodide—The dosage of gr. iii usually advocated for adults is too large and causes depression—gr. ii as individual dosage is equally effective—the total being gr. vi. Luminal proved the best sedative. In 114 cases so treated 6.1 per cent of relapses were subsequently registered. Three extraordinarily resistant cases remained uncured after nine separate courses. Emetine periodide and auremetine proved far less efficacious. Quinoxyl (yatren chinfolon, anayodin) by mouth and retention enema was useful in curing cases resistant to E. B. I. but in a series of 35 freshly occurring infections relapses were subsequently registered in 22.8 per cent. Combined (synergic) treatment advocated by the author consists of a combination of E. B. I. at night with daily quinoxyl retention enemas for 10 days.

Dietetic precautions are necessary and no solid food should be permitted for 3½ hours before giving E. B. I. In 361 cases so treated there was a relapse rate of 3.7 per cent but this refractory residuum was subsequently cured by a further course and by increasing the strength of quinoxyl retention enema to 5 per cent. Stovarsol and carbarsone given an extensive trial proved less satisfactory. Seven cases of arsenical poisoning were recorded with the former and active *Entamoeba* were demonstrated in a patient undergoing prolonged treatment (gr. viii daily) with the latter. Enterovioform, rivanol, gavano chaparro concense kurchino hydrochloride, and kurchi bismuth iodide all proved unsatisfactory.

It is concluded that in order to attain permanent cure *therapia magna sterilisans* has to be aimed at and this can be secured by employing the combined treatment by which eventual cure of all cases, however long-standing was attained. Many cases have been continuously observed and checked for 10 years and even longer. A primary

infection is more easily eradicated than one of long standing. Periodic injections of emetine or inadequate doses by mouth render *E. histolytica* emetine-resistant. P M B

DORMER (B A) & FRIEDLANDER (J) Amoebiasis—Pulmonary Complications.—*Brit Med J* 1941 Aug 23 pp 258-261 With 2 figs

Their experience in Natal leads the authors to the belief that pulmonary amoebiasis is fairly common in the coastal belt more particularly amongst the non European population.

It is the contention of the authors that wherever amoebic dysentery occurs pulmonary complications will be found in a high percentage of untreated cases. Amoebiasis of the lung may be primary or secondary the former being comparatively rare.

Their cases have presented the following signs and symptoms: cough, sputum, haemoptysis, wasting, night sweats, nocturnal pyrexia resembling that of tuberculosis.

Diagnosis is effected by suggestive history, absence of tubercle bacilli, presence of eosinophilia and cysts of *E. histolytica* in the faeces but mainly on the effect of emetine and carbarsone treatment.

Secondary pulmonary amoebiasis is the result of direct extension of an amoebic abscess of the liver which may rupture into the pleural cavity giving rise to an empyema but more often the diaphragmatic pleura becomes adherent shutting off the pleural cavity and facilitating extension of amoebic infection into the lung base.

The patient complains of cough with anchovy paste sputum, loss of weight, night sweats, and, because of these symptoms, cases are often wrongly diagnosed as basal tuberculosis, especially in the Bantu since it is commoner in primitive races.

Radiological Appearances—In primary pulmonary amoebiasis the radiograph may present the appearance of tuberculous infiltration or bronchopneumonic consolidation. In secondary amoebiasis of the lung there is usually well marked opacity at the base with obliteration of the costo-phrenic angle and immobility of the right side of the diaphragm.

The septum between middle and lower lobes usually hardly discernible on the radiograph becomes thickened and appears as a fairly thick band limiting the inflammatory process to the base.

As in primary amoebiasis emetine and carbarsone have a rapid and dramatic effect. When an empyema is present drainage is necessary in addition.

Seven illustrative cases are cited in support of these statements.

[Criticism may be levelled at the presentation of this paper in that the cases do not appear to have been carefully worked out. Frequent faeces examination and sigmoidoscopy would have probably revealed more positive evidence of amoebic infection. The statement that eosinophilia is evoked by amoebic infection is open to serious doubt. In the cases cited the eosinophile counts were from 5 to 10 per cent. In indigenous natives of a semi tropical country such counts are quite common and cannot be called excessive. [See this *Bulletin* 1924 Vol. 21 p 22.] P M B

WYATT (Thomas E.) & BUCHHOLZ (Ransom R.) Amebiasis Outbreak.—
Ann. Surg. 1941 Jan. Vol. 113, No. 1 pp. 140-152.
 With 9 figs. 33 refs.]

Two more cases of *E. histolytica* infection of the skin—cutaneous amoebiasis—are detailed by the author who has collected 23 records in the literature and of the latter brief notes are given in this article. Cases are classifiable into four groups: 1. Those following drainage of amoebic hepatic abscess. 2. Those following drainage of a ruptured appendix, or faecal fistula. 3. Those following drainage of a ruptured amoebic abscess associated with amoebic colitis. 4. Cases not directly connected with viscera (this group the present authors do not discuss). The total is now thirty and a noteworthy point in the two last; that both occurred after operation for liver abscess, but in neither were amoebae found in the stools. The first was a negro of 63 years who died in spite of the administration of emetine hydrochloride and other forms of treatment; the second was a man of 34 years who presented a truly terrible condition—a gangrenous process which extended over the whole abdominal wall. He left hospital, cured, after a stay of 16½ weeks. MANSON BARNES has noted that the response to emetine of patients with cutaneous amoebiasis is usually good and at times in instantaneous and almost miraculous.

WRIGHT (H. W. S.) The Surgical Complications of Amoebic Dysentery.—
Brit. Med. J. 1941 Aug. 23 pp. 251-253.

HARTMAN (Howard R.) & HYER (Franklin A.) Giardiasis and its Treatment: a Clinical Study.—*J. Amer. Med. Assoc.* 1941 June 28 Vol. 118, No. 26 pp. 2835-2839. 17 refs.

The paper discusses 100 cases of *Giardia intestinalis* infection in which the commonest symptoms were diarrhoea and abdominal pain. In 52 of the cases the flagellate was the only apparent cause of the diarrhoea. In 11 of the cases there were no symptoms which could be attributed to it; the organism being discovered during routine examinations. In other cases of the infection there were definite lesions to account for symptoms. In 13 cases which are described in some detail it would appear that the *G. intestinalis* infection was the cause of the disability complained of and this conclusion is borne out by the fact that definite relief followed eradication of the infection. Of the 100 cases 48 were treated with atabrin (0.1 gramme three times a day for five days) see CLEBERTSON below but in only 35 of these was it possible to carry out post treatment examinations. Of the 35 only one failed to respond to the treatment the infection being entirely eliminated in 34.

CLEBERTSON (James T.) Specific Chemotherapy of Giardiasis Infections.—*J. Lab. & Clin. Med.* 1941 June Vol. 25, No. 9 pp. 1465-1470.

The paper describes the successful treatment with atabrin of two cases of *Giardia intestinalis* infection, one of which had been of five years duration. The drug was administered orally, two 0.1 gm. tablets being given each day for five days. Experiments on *G. muris* in rats and mice showed that atabrin was equally effective in ridding the animals of their infection. Other protozoal parasites of the rats were

not affected The allied substance acriflavine also cured rats of *G muris* infection but it was more toxic to the animals than atebun

C M W

Liu (H L.) *Balantidium* Infection in Man Report of a Case from
Chefoo—*Chinese Med J* 1941 May Vol 59 No 5 pp
476-479 With 3 figs on 1 plate

During the treatment of a child two years of age for kala azar at the Temple Hill Hospital Chefoo N China there was occasion to examine the stools because of persistent diarrhoea. A *Balantidium coli* infection was discovered. This yielded to treatment with Spirocid. It is noted that though pigs are very commonly kept in China human infections with the ciliate are of rare occurrence only four previous cases having been reported.

C M W

BACILLARY DYSENTERY

MANSON BAHR (P) *Treatment of Dysentery*—*Med Press & Circular*
1941 July 23 Vol. 206 No 4 pp 64-68

An article for General Practitioners. Dysentery implies the presence of blood and mucus in the faeces. In Britain this usually denotes ulcerative colitis in those under 40 and malignant disease in those over this age. Ulcerative colitis is better diagnosed by feeling the resistant granular surface by digital examination than by proctoscopy and is better treated by a bland high protein diet than the reverse. Of the other remedies blood transfusions and 5 per cent bismuth subgallate in olive oil per rectum are the best.

True dysentery is by no means uncommon in England and the bacteriological diagnosis is of practical importance. Incompletely cured cases are a potent means of spreading epidemics. Sonne infections are protean in their clinical manifestations and the organisms can only be isolated from freshly passed stools or better from fresh rectal swabs. There have been many serious outbreaks of Flexner dysentery especially in institutions in the early autumn. The presence of many pus cells and a few histiocytes containing red blood cells in the stools is a valuable method of making the diagnosis. Antidysenteric serum should be reserved for the more severe cases. Replacement of fluid lost, colloidal kaolin and sodium sulphate are all that is needed for the milder cases. Sulphaguanidine (sulphanilyl guanidine) will probably take an important place in treatment in the future. Amoebic dysentery is not uncommon in those who have been in the tropics and is not nearly so dangerous as is often supposed. It may mimic many abdominal diseases one of the main traps being the simulation of carcinoma by granulomata. Amoebae can be found in scrapings from these. Emetine injections are effective in the acute stage of the dysentery and in metastatic abscesses but emetine bismuth iodide is necessary for the chronic stage. Two grains should be given at 10 p.m. preceded by one gram of phenobarbitone nightly for 10 nights and this treatment may well be combined with seven-ounce rectal injections of 2 per cent. quinoxyl solution.

(2140)

Charles Newman

ANDERSON (David E. W.) & CRICKSHANK (Robert) The Treatment of Bacillary (Flexner) Dysentery with Sulphanilguanidine. With a Note on the Preparation of the Drug, by James WALKER.—*Brit Med J* 1941 Oct. 11 pp 497-501
 British Medical Journal 1941 Oct 11 p 514 Sulphanilguanidine as Intestinal Antiseptic.

Tests *in vitro* of bactericidal activity of antiseptics afford no guide to their usefulness in suppressing bacteria in the gut but the bactericidal action on normal intestinal flora is the most useful index for therapeutic trials. From December 1940 to June 1941 an opportunity occurred of giving sulphanilguanidine a therapeutic trial in an epidemic of Flexner dysentery in a mental hospital. In this particular outbreak the infection was more than usually severe and protracted the prevalent type of organism being *Shigella dysenteriae* (Flexner 2) and later Flexner 1.

Twenty-six cases were selected of which 41 were treated with this drug and 55 remained as untreated controls. The patients varied in age from 25 to 6 years the majority were over 50. 40 were males and 56 females. Many were in poor physical condition. The drug was given in powder form as a suspension in water or milk, was found to be tasteless and did not produce any nausea or vomiting. At first the dosage was 6 gm daily in three doses of 2 gm. It was found later 9 gm daily (in three doses of 3 gm) for two days followed by 4 gm a day (in two doses of 2 gm). If the diarrhoea was uncontrolled in four days the maintenance dose of 4 gm a day was continued for one week. All these are smaller doses than those recommended by MARSHALL *et al* see this Bulletin 1941 Vol. 38 p 397. Further experience has shown that larger doses can be safely used in more severe cases of dysentery.

Cases treated and untreated, were divided into two groups seven and mild. The criteria for the former were—high initial pyrexia (101–103 F), frequent stools and toxic prostration. Of 41 treated cases 23 were severe and 13 mild there being a higher proportion of the former in the treated than in the untreated groups. Two deaths were registered in the treated and three in the untreated series. The criteria of response to sulphanilguanidine were change in character and frequency of stools, rapid fall of temperature and disappearance of toxic symptoms. It was found that the number of motions was less reliable in this respect than the disappearance of blood and mucus from the stools. In the severe cases the average time was 3 days from onset, with a range of 2–5 days amongst the severe untreated cases the average duration was 6–8 days. There were outstanding cases with critical fall of temperature apparently in response to drug therapy. In a typical severe case improvement was noted within 24 hours and convalescence was shorter than in the untreated.

In the treated group of severe cases five suffered slight relapses with blood and mucus in the stools for one or two days. All occurred within a week of the cessation of drug therapy and probably represented true relapses. In only one was the Flexner bacillus isolated during examination of rectal swabs (by rectal speculum and loop). The material obtained, mucus with little faecal matter was cultured on MacConkey medium or subsequently on a desoxycholate agar (a modification of the Difco S.S. formula details to be published at some

future date) which gave a much higher percentage of positive isolations (Flexner)—92.5 per cent as against 61.4 per cent. With this new medium which detects relatively small numbers of pathogens in faeces it was possible to assess the value of sulphanilylguanidine in eliminating these bacilli from the bowel.

Of considerable importance is the effect of this drug in preventing the convalescent carrier state especially when it is given in the acute stage but if it is administered *after* the cessation of diarrhoea it is less likely to influence the carrier state as the drug will now encounter much more organic matter and an increased number of saprophytic organisms in the bowel. This has been the experience with sulphanilylguanidine in the treatment of Sonne dysentery in which convalescent carriers are common. Thus of 43 faecal specimens examined from 16 treated patients after the seventh day of disease 4 only were positive whereas 14 out of 54 similar specimens from 17 untreated patients were positive.

The average concentration of the drug in the blood examined about two hours after the last dose of 2 gm. and a total of 6–12 gm. in the previous 24 hours was 1.55 mgm. of free sulphanilylguanidine and 2.27 mgm. of the total drug per 100 cc. The drug concentration at twenty-four hours for free sulphanilylguanidine was from 0.5 to 3 mgm. and for total drug from 0.75 to 6 mgm. per 100 cc. These figures when compared with blood levels after similar doses of other sulphonamides show that sulphanilylguanidine is poorly absorbed from the bowel and that the amount absorbed bears some relation to the dosage given.

The urinary concentration on the fourth day after treatment averaged 94.3 mgm. per 100 cc. for free drug and 150.2 per 100 cc. for total drug, which indicated that the absorbed fraction was being readily excreted. The concentration rose to maximum between twelve to thirty-six hours after commencing treatment. There was no evidence that the drug was retained in the tissues for any time after absorption.

With one exception no clinical evidence of toxicity was noted in this case a morbilliform rash occurred on the twelfth day of treatment in a patient who had received a total dosage of 58 gm.

Sulphanilylguanidine crystals in the shape of narrow rectangles were present in the urinary deposits of 21 of 28 patients and the presence and amount of crystalline deposit bore a close relationship to the urinary drug concentration. Investigations on the white cell counts of treated cases showed that the drug in therapeutic doses has practically no toxicity for the tissues.

Preparation of Sulphanilylguanidine—Condensation of acetyl sulphanilyl chloride with guanidine nitrate in the presence of a large excess of sodium hydroxide yields acetylsulphanilylguanidine which is subsequently hydrolysed with hydrochloric acid to free sulphanilylguanidine. As initially obtained this forms a pasty white solid which tenaciously retains water and drying is a slow process under ordinary conditions.

P. Manson Bah

BROWNER (George) & TONKIN (Isabel M.) Sulphanilylbenzamide in the Chemotherapy of Bacillary Dysentery [Correspondence]—*Nature* 1941 Aug 9 Vol. 148 No. 3745 pp 167–168

The authors show that sulphanilylbenzamide though absorbed from the intestinal canal of the rabbit one and a half times as much

as sulphanilylguanidine is as effective as the latter in its antibacterial action on the coliform organisms of the gut of mice. Furthermore, whereas Sonne strains are resistant, and Shiga strains and typhoid bacilli somewhat resistant, to sulphanilylguanidine *in vitro* sulphanilylbenzamide has proved highly potent in all types. Arrangements for clinical trials in man are being made. C II

BELL (G. J.) Treatment of Bacillary Dysentery with M. & B. 693.—*Lancet* 1941 July 26 p. 101 With 1 chart.

An epidemic of Flexner V (two-thirds) and of Sonne dysentery broke out in a colony of mental defectives, and 16 were affected.

On the whole the symptoms of those infected with the former tended to be more severe. All cases were treated with sulphapyridine (M. & B. 693) in doses of 0.5 gm. four hourly by the mouth. The average total dose being 5.0 gm.

No symptoms of intolerance were noted and the results obtained were considered satisfactory. All cases cleared up in 36-72 hours and the effect on the pyrexia was immediate. After the passage of blood and mucus had ceased there was a period of constipation before normal stools appeared.

Dysentery bacilli were never found in any specimen later than 36 hours after the commencement of the treatment. P M D

COWTON (Arthur) Treatment of Bacillary Dysentery (Correspondence — *Brit Med J* 1941 Aug 23 pp 280-281)

In this letter the author who is Director of Laboratories Alexandria Municipality makes a plea for the use of phage in the treatment of bacillary dysentery but although he says that "it can emphatically be stated that the treatment of bacillary dysentery presents no problem whatever provided one has at one's disposal good phage preparations and knows how to use them" he points out that phage cannot be expected to be useful except in the early days of the disease before ulceration and invasion with secondary organisms has taken place. Commercial dysentery phage preparations are prepared usually against classical strains only and therefore in cases which have progressed beyond the initial stage phage preparations to cover supplementary organisms are necessary in addition to those covering the classical strains.

The treatment advised is as follows — The patient is put to bed on a starvation diet of Vichy, Evian, or other mineral water for 24 hours. On the first day a 2 cc. ampoule of a good dysentery and meta dysentery phage preparation, alternating with a like ampoule of a good Salmonella and coliform phage preparation every four hours "is given. This may be repeated on the second day. The author claims that good phage acts more quickly and thoroughly than sulphapyridine and that tenesmus disappears quickly. Phage is quite harmless. Sulphonamides may be of value in chronic cases. C II

BLOCK (L. H.) TARNOWSKI (A.) & GREEN (B. H.) Pectin and Nickel Pectinate in Acute and Chronic Bacillary Dysentery — *Amer J Digestive Dis* 1939 Vol 6 p. 96.

Nickel pectinate affords a valuable contribution to the treatment of bacillary dysentery. Pure pectin is quite ineffective but nickel

pectinate possesses detoxifying bactericidal and anti haemorrhagic properties which render it effective in the treatment of bacillary dysentery. It was tried out in 95 cases composed of two groups one of 10 adult females and the other of adult females and children. Definite improvement in appearance and general condition was observed in every patient.

Dosage—Nickel pectinate was administered in large amounts—two ounces in cereals or milk three times daily. This amount sufficed to control haemorrhage and promote detoxication. Latterly, the dose was increased to two ounces every three hours. Flaky nickel pectinate dissolves readily in iced water and with an equal volume forms an even syrupy mixture when this is added to four ounces of hot cocoa or milk the resulting mixture is palatable.

P M B

ARNOLD (L.) *Bactericidal Action of Pectin and Metal Pectinates*—*Amer Jl Digestive Dis* 1939 Vol 6 p 104

Various preparations containing pectin have been employed for the treatment of diarrhoea but pectin possesses no bactericidal action. Several pectinates of nickel cobalt manganese lead, zinc copper calcium and silver have been studied upon cultures of *Bact coli* with appropriate controls. Silver pectinates exerted the greatest bactericidal action but nickel pectinates are more soluble. It is concluded that metal pectinates are non toxic, non-irritating bactericidal compounds in which the metal ion acts similarly to a colloidal compound attached to pectin as a vehicle.

P M -B

MYERS (Philip B) & ROUSE (Alvin H.) *Pectinates, with Special Reference to Nickel Pectinates and their Therapeutic Value.*—*Amer Jl Digestive Dis* 1940 Jan Vol 7 No 1 pp 39-44 [22 refs]

Pectin is the intra-cellular cement of cell wall tissue occurring in fruits and succulent vegetables especially in lemons oranges grape fruit etc. Commercial pectin is derived from the rind of citrus fruit and apple pomace. When mixed with sugar acid or water it forms a jelly. The addition of small amounts of certain metals to pectin intensifies its colloidal properties. It is assumed that the inhibiting action of nickel pectinate on the growth of bacteria is due to ionization of the nickel, and the substance ionizes to a greater degree as the pH is decreased. Nickel pectinate acts as a catalyst and this activity of nickel has been utilized for many years for promoting chemical reactions. Therefore the catalytic production of antitoxin and agglutinin by nickel pectinate is feasible and may also aid in the assimilation of vitamins. In this direction it may be curative in ulcerative colitis as in a case under the care of T T MACKIE in which nickel pectinate brought about complete recovery when all other measures had failed.

P M -B

YAWS AND SYPHILIS

CUÉLLAR (P. L. Vargas) El pian en el departamento del Valle del Cauca, Colombia. [Yaws in Valle del Cauca, Colombia.]—*Boletín Oficina Sanitaria Panamericana* 1941 Sept. Vol. 20 No. 9 pp 897-913 With 1 map in text & 11 figs on 3 plates English summary

This article contains some points of interest among much that is elementary and has been known since yaws began to be studied. The author defines the disease gives an account of its history its geographical distribution [see GUERRA below] considers race sex age atmospheric conditions, clothing food, etc as they are thought to influence acquisition of infection insect vectors, the spirochaete its discovery morphology staining characters distribution in the body pathological histology of lesions clinical description of lesions and treatment The editor of the *Bulletin* states that he has been obliged to abbreviate the article for want of space

The following points may interest readers of this *Bulletin* In Colombia the regions of heaviest incidence are the most warm areas near the river mouths but it occurs also in Tolima, a dry district In the author's experience Indians seem to have some natural resistance for among 1,281 patients only two were cholo Indians two others who were inoculated with yaws did not develop any symptoms for six weeks and had no sequelae He has noted a coincidence between yaws prevalence and lack of vitamin C and the converse of this, refractory cases would improve markedly when vitamin C was given without specific treatment As regards transmission he mentions among other means sexual intercourse and bats (he mentions a case where the primary lesion was at the site of a bat's bite but as direct contact, or insects, e.g. *Hippelates* may transmit infection it is quite possible that the wound may have become secondarily infected, as the lesion did not appear for 1½ months) He gives a list of symptoms, mentioning 32 some at least are not characteristic such as ankylosis, bone pains, fractures. He remarks on the need for general, as apart from specific, treatment—eradication of parasites, of malaria and vitamin deficiency and notes the low fatality rate—no deaths among his 1,281 patients, and only one among 2,000 in another area

H H S

CONGO BELGE RAPPORT SUR L'HYGIÈNE PUBLIQUE AU CONGO
BELGE PENDANT L'ANNÉE 1939 VAN HOOFF (L.)—[Yaws
pp 48-47]

During 1939 some 316,220 cases were treated in the Colony as a whole The itinerant services including Foréam discovered 64,388 new cases the heaviest figures being recorded from the Provinces of Coquilhatville Stanleyville and Costermansville It is noted that in those areas in which treatment has been given on a large scale for several years the infection rate is rapidly reduced and that the incidence of tropical ulcer similarly falls.

C II

RUTTER (Allen G.) The Incidence and Treatment of Yaws in the Western Solomon Islands.—*Trans Roy Soc Trop Med & Hyg* 1941 May 27 Vol. 34 No 6. pp 429-444

TUMBELAKA (J F) & SOETOPO (M) Framboesia-infectie op pokpuisten [Yaws Infection of a Vaccinia Pustule].—*Geneesk Tijdschr v Nederl Indië* 1940 Nov 19 Vol 80 No 47 pp 2745-2748 With 3 figs on 1 plate English summary (4 lines)

[There is no obvious reason why a vaccination pustule if left uncovered should not be the site of an inoculated yaws sore but from general observation it is sufficiently uncommon to be worth recording especially as the secondary yaws eruption might be erroneously diagnosed as generalized vaccinia occurring late] The authors report the cases of 5 children in whom the mother yaws developed on a vaccinia pustule. One showed an atrophic scar at the primary site but a generalized yaws eruption. Diagnosis in others was confirmed by finding *Spirochaeta pertenax* in serum from the lesion

H H S

SOETOPO (M) Leproide uitslagen bij framboesia [A Rash simulating Leprosy in a Case of Yaws].—*Geneesk Tijdschr v Nederl Indië* 1940 July 16 Vol 80 No 29 pp 1765-1768 With 4 figs on 1 plate English summary (4 lines)

A man of 25 years presented himself on account of a rash on the extensor aspect of the left upper and fore arm. There was a small deposit on the left shoulder and the right nates. He denied ever having had syphilis but had suffered from yaws in his youth. Examination of exudate revealed no lepra bacilli nor spirochaetes but the Wassermann and Sachs-Georgi tests both gave a strong positive due it is supposed to the old yaws. A section of the lesion examined microscopically did not show the usual changes of yaws but a mucoid degeneration of the deeper layers of the skin. The eruption was painless and non irritating. [It is not very clear why this condition should be called 'leproid' for careful examination failed to reveal any other sign of leprosy, whether the denial of syphilis has much weight in the face of a strongly positive Wassermann reaction in a man of 25 years who had had yaws as a child is a doubtful point as a rule the WR. in a yaws patient becomes negative at or before puberty and a positive thereafter is rather indicative of syphilis]

H H S

OOMEN (H A. P. C.) Over framboetische afwijkingen van de neusholten II. Vergelijkende diagnostiek. Analyse van de gangosa-syndromen [Lesions of the Nasal Cavity in Yaws, Analysis of the Gangosa Syndrome].—*Geneesk Tijdschr v Nederl Indië* 1941 Apr 15 Vol 81 No 15 pp 810-830 With 4 figs. on 1 plate [19 refs.] English summary

Various diseases contribute to the clinical picture known as gangosa or rhinopharyngitis mutilans. These names are

to be reserved for chronic inflammations of destructive character situated within or in the neighbourhood of the nasal cavities. The scope of this study is to determine the distribution of their different causes in Northern Celebes and to explore the congruences and differences between the relative diseases.

In 99 of the 160 reported cases deformities (scars, retractions perforations) were prevailing in 61 cases there were only inflammatory processes (granulomata ulcers) present. From both groups 71 resp. 11 had to be ascribed to tertiary yaws 15 resp. 14 to rhinoscleroma, 13 resp. 30 to leprosy. From the second group only 1 to syphilis, III 2 to tuberculosis and 3 to reticulo-sarcoma. Furthermore 13 cases pertain to ozaena.

The most serious deformities and retractions were met with in yaws the nasal process often being the only tertiary manifestation of the disease. When exact denomination is necessary the name rhino-rhinopharyngitis mutilans framboetica should be preferred to the mentioned historical identifications.

In leprosy internal and external deformities of the nose and the nasal pharynx only proved to be present in serious and advanced cases. Leprous destructions may reveal close resemblance to lesions of framboetic origin. The detection of lepra bacilli and the presence of other leprosy lesions must give here decisive information. The indications provided by the syphilitic serum tests in these cases are of minor importance.

In rhinoscleroma too after many years of healing from the nodular lesions mutilations may be present. Generally however they are neither so serious nor so extensive as in yaws. During the active stage of the disease the causing klebsiella may be isolated, and the complement fixation test is positive.

If syphilis is suspected, great importance must be assigned to the environment and the history of the patient. Nasal lesions caused by hereditary syphilis may be expected before or in the second decennium of life. Tertiary manifestations of the acquired disease not long before the fourth. The nasal manifestations of tertiary yaws however frequently have their most active stage within the third decennium.

As compared with the already mentioned diseases, ozaena must be defined as a superficial symmetrically diffused affection, whereas tertiary yaws habitually manifests itself in several severe local processes.

"In burnt out cases of yaws the serum tests may be found negative even without previous treatment. Perhaps this may be true too with the complement fixation test in corresponding cases of rhinoscleroma.

Liability to cause the greatest diagnostic difficulties are incipient lesions as granulomata or ulcers. The infiltrations as observed in the beginning of tertiary yaws of syphilis, of rhinoscleroma, of leprosy and of reticulo-sarcoma frequently present a striking mutual resemblance. For this reason, serological bacterioscopic bacteriological and histological investigations are indispensable for specific diagnosis and treatment.

None of the reported cases seemed to have any relation to lupus in other countries the commonest cause of such deformities. But for 3 exceptions the etiology of the affection could be reasonably proved. It is improbable that the remaining cases pertain to some other not reported cause.

ANGULO (Luis Nájera) Sobre un caso de gundú en la Guinea Española [A Case of Goundou in Spanish Guinea.]—Reprinted from *Africa Médica* 1940 Oct. No 10 8 pp With 1 fig

PROVIA (h. J.) De bulgcontractuur aan den pink een typisch laat tertiair symptoom van framboesia tropica [Bow Contracture of the Little Finger, a Typical Late Tertiary Symptom of Yaws.]—*Geneesk Tijdschr v Nederl Indië* 1941 July 1 Vol. 81 No 26 pp 1403-1407 With 4 figs on 1 plate

The symptom of crooked finger has already been described as occurring in yaws but does not seem to be generally known. Although not exclusively it is most commonly found in the little finger and next most commonly in the fourth finger. The curvature cannot be spontaneously straightened although sometimes this is possible by the use of force. Other signs of yaws may be present in the palm of the hand or sole of the foot such as hyperkeratosis, keratosis punctata and atrophy, and the skin may be glazed. There are grounds for supposing that the primary contraction is of the skin and that the shrinkage of the joint capsule occurs subsequently. The phenomenon is one of the late tertiary stage of yaws.

W. F. Harvey

GUERRA (Gonzalo) El plan en el litoral pacífico colombiano. Cómo debe orientarse su campaña. [Suggestions for a Campaign against Yaws on the Pacific Coast of Colombia.]—*Bolet. Oficina Sanitaria Panamericana* 1941 Sept. Vol. 20 No 9 pp 895-897 English summary

According to estimates the number of cases of yaws on the coastal regions of Colombia exceeds 80 000 the rural areas extending along the rivers, Chocó, Tumaco and Barbacoas being most heavily infected. Suggestions for dealing with the whole country are put forward these include (1) Division of the country into districts (2) Provision of personnel proportional to the incidence of the disease on the following lines—(a) A dispensary for every 1 000 cases (b) A hospital for every 15 000-20 000 (c) Four physicians (at least) for every 5 000 cases (d) Two inspectors for every 1 000 cases (e) One nurse for every 500 cases (f) Educational hygienic instruction by nurses (g) Treatment by neoarsphenamine and quimo-bismol paroxyl compound [the composition of this is not given] which have given good results on trial (h) Government to arrange for manufacture of these drugs (i) Cost of the campaign to be helped by mine-owners since many of the yaws foci are near mining areas.

H. H. S.

MALTANER (Elizabeth) Reaction of Sera from Patients with Yaws in Quantitative Complement-Fixation Tests for Syphilis and Tuberculosis.—*Amer. J. Trop. Med.* 1941 Jan Vol. 21 No 1 pp 145-150 [10 refs.]

The author first quotes the Jamaica Yaws Commission as having pointed out that yaws is usually resistant to treatment if one may judge by the persistence of serological reactions. Also GOTAY, COSTA, MANDRY and PAYNE found in about 100 cases of yaws in Porto Rico that after three years of intensive treatment with neoarsphenamine about 50 per cent still had positive reactions to syphilitic serum tests. In order to investigate the serological reactions further the author

obtained from Jamaica 44 specimens of serum from cases of yaws and submitted them to complement fixation tests for syphilis and for tuberculosis according to the quantitative method of the New York State Department of Health's Division of Laboratories [*Bulletin of Hygiene* 1939 Vol. 14 p 132]. As regards tests for syphilis, 41 of the 44 gave complement fixation reactions and in 35 the titre was over 10. Of the 35 12 had titres from 200 to 400 and in the same number it ranged from 100 to 200. Of the 44 cases six were untreated, and five of the sera from them had titres from 53 to 390. In the sixth, a primary case of one month's duration, it was only 7.9. In 28 cases in which details of treatment had been furnished the amount ranged from 1 to 12 injections. Three sera with high complement fixation titres showed marked zonal phenomena when tested by the Kahn and the Kline methods. None of the sera gave a strong reaction with tuberculous antigen in all but two the titre was less than three, and in the two exceptions it was 3.5 and 3.8. In this respect the sera were unlike leprosy sera, which give strong complement fixation reactions with the tuberculous antigen. The relatively small proportion of sera from leprosy cases which give reactions with the antigen used for syphilis diagnosis and similarly the small proportion of yaws sera which give a reaction with tuberculous antigen suggest that when the syphilis reaction is found in leprosy and the tuberculosis reaction in yaws it is due to coincident infection with the diseases concerned. The author attributes the syphilis reaction in yaws and the tuberculosis reaction in leprosy to the presence of common antigenic constituents in the spirochaetes of the former pair and in the acid fast bacilli of the latter.

L. W. Harris

- KAHN (R. L. McDERMOTT (E. B.) & MARCUS (S.) Effect of Temperature on Kahn Reaction. I. With Serologically Positive Sera of Lower Animals.—*Am J Hyg* 1941 Mar Vol. 25. No. 2 pp 151-158. II. With Serologically Positive Sera of Human Syphilis.—*Ibid* pp 157-161. III. With Serologically Positive Sera in the Absence of Syphilis.—*Ibid* pp 162-172. IV. With Serologically Negative Sera in the Absence of Syphilis.—*Ibid* pp 173-178. Summary appears also in *Bulletin of Hygiene*.

Some time ago Kahn published in *Arch Dermat & Syph*, 1940 Vol. 41 p 817 [*Bull of Hyg* 1940 Vol. 15 p 641, details of a verification test which was based on the principle that a Kahn reaction which is due to syphilis reagent is stronger at 37°C. than at 1°C. while one of what the author termed the general biologic type is stronger at 1°C. and weaker at 37°C. The present article is a development of the same theme. In the first section the blood sera of pigs, horses, rabbits and chickens were subjected to the differential test. The reactions to the standard Kahn test at 21°C. were 98 per cent positive or doubtful in the case of the pig sera, 91 per cent in horse sera, 58 per cent in rabbit, and 32 per cent in chicken. The results of the differential tests at 37°C. and 1°C. are shown in a number of tables which demonstrate that the positive reactions to the Kahn standard test were of the general biologic type. In the second section the authors report on the behaviour of 195 sera from syphilitic persons similarly tested. Of the 195 syphilitic sera 101 gave a positive reaction with the Kahn standard test and 94 a negative. Of the positive sera, 100 gave stronger reactions at 37°C. than at 1°C., and one the

reverse. The inference was that this serum's reaction to the standard test had been of the general biologic type. Of the 94 negative sera 92 were negative at all temperatures and 2 gave a moderately positive reaction at 1°C.

In the third section the authors report on tests by the same method of sera from cases of leprosy, malaria and a variety of other pathological presumably non-syphilitic conditions. The leprosy sera fell into two categories syphilitic and general biologic 16 of 44 being the former and 28 the latter. At the time of writing the authors could not say if the reactions in the case of the 16 were due to concomitant syphilis. Generally it was found that when the reaction was of the syphilitic type the standard Kahn test gave a very strong reaction and it was necessary to dilute the serum to bring out the differences in behaviour at 1°C and 37°C respectively. With malarial sera the behaviour was more clean cut and the authors give examples of the growth of the biologic type of reaction during attacks of malaria and its fading away after recovery. The authors express the hope that the verification test will prove very useful in distinguishing between Kahn reactions due to malaria and those due to syphilis in countries where the former disease is prevalent. With border line reactions it was found that non-syphilitic sera tend to give the reaction at 1°C both after heating at 56°C and in the unheated state. Syphilitic sera on the other hand tended particularly to be negative at 1°C in the unheated state.

In the fourth section it is shown that non-syphilitic sera human or animal giving negative reactions to the standard Kahn test fall into two categories those which do not react at either 37°C or at 1°C and those which give a reaction at 1°C. In a number of tables it is shown that an important proportion of non-syphilitic sera are of this second type and the authors say of them that they have an inherent property of giving the general biologic type of reaction. A person with serum of this type though usually negative to the standard test may become positive as a result of developing a febrile condition or some affection which tends to promote the general biologic type of reaction. The authors suggest that reactions to the Kahn test should not be reported merely as positive but as syphilitic or general biologic. [See also CHAI *Bull of Hyg* 1941 Vol. 16 p 413]

L W Harrison

SPRUE

DE FIGUEIREDO (Fernando Vaz) O primeiro caso de sprue tropical no Brasil. [The First Case of Tropical Sprue in Brazil.]—*Acta Med Rio de Janeiro* 1941 June Vol. 7 No 6 pp 255-267 With 1 fig English summary

The author states as the title of the paper shows that this is the first case of sprue in Brazil (whether he means the first to be reported or the first case to arise indigenously is not stated). The case seems to have been quite typical till near the end when certain nervous symptoms with incontinence appeared. There were the bulky fermenting stools the steatorrhoea anaemia (but the colour index was low 0.7) stomatitis and glossitis and meteorism.

De etc. treatment with high protein, low carbohydrate and fat content was given with injections of liver extract and vitamins. The patient was a Brazilian, 23 years of age. The disease ended fatally the fourth of illness is not certain as the onset was insidious but death occurred two months after admission to hospital. At autopsy the main morbid feature was change in the spinal cord, the presence of numerous corpora amylacea chiefly in the columns of Goll and Burdach with granular cells containing "inclusions" which stain well with scarlet-red. Other uncommon appearances were haemorrhages in the duodenal mucosa and submucosa. There was also calcification of the tracheo-bronchial glands with ruberulosis, and atrophy of the subarachnoid cortex and malial pigment in liver and spleen.

Holtz (H. W.) & Dierckx (H. G.) Röntgenologische Dünn-
darmbefunde bei Sprue. Radiological Findings in the Small Intestine
in Sprue.—*Sprue Med Woch* 1941 June 14 Vol 7
No 24 PP 748-750 With 4 text. 11 refs.

A study of the radiographical changes in the small intestine in non-tropical sprue is based upon the assumption that the main aetiological factor lies in the presence of an unascertainable and not exactly explicable *enteritis* of the intestinal mucosa.

As the results of many autopsies have demonstrated, the morbid mucosal does not clearly explain the peculiar intestinal dysfunction in sprue. Cowell, Macdonald, Muller and Weller in America have described radiological features especially narrowing of the lumen, alteration of structure and sparseness of the mucosal relief pattern and increased mobility. Little described changes in the intestinal wall of the duodenum and jejunum and ileum due to chronic inflammation and stenosis of the small intestine. Kuhlmann observed oedema of the mucosa and stagnation of the meal in the lower ileum.

The authors of this paper have had access to eight cases of non-tropical sprue in various stages of the disease and have by the mucosal relief method been able to pay special attention to the mucosal pattern.

In a particularly severe case the duodenum was dilated and atonic and the mucosal pattern defective. The upper jejunal folds were broad and hand-shaped with small, irregular, circumscribed lateral indentations. In the lower jejunum and upper ileum hypertonic oes were present with strong, contractures and coarse snow-like mucosal relief pattern gave the appearance of coarse snowflake spots. The ileum was hypotonic. Similar but less severe changes were present in two other sprue patients and in one case of symptomatic sprue secondary to a tuberculosis. In a recovered case the appearances were normal. It is claimed that the changes in the small intestine demonstrated in the radiological method are the result of intestinal hurry and interference with the normal mixing of the intestinal contents.

Astrosky (R.) Scleroderma et lacunae. Scleroderma and
Lacunae.—*Sprue Med Woch* 1941 Apr 12 Vol 7
No 15 PP 510-512 23 refs.

Scleroderma is no longer regarded as an expression of dysfunction of the hepatopancreatic apparatus but rather as disturbance of resorption from the intestinal tract. This is typified by three syndromes —

- 1 Coeliac diseases—Gee-Herter disease (idopathic steatorrhoea) and sprue
2. Hypo- and avitaminosis B₂.
- 3 Adrenal insufficiency (Addison's disease)

1 Coeliac Diseases

DUBOIS (1939) in views expressed in a monograph maintains that the physiopathology lies in a definite alteration of lactoflavin absorption. But observations based on oral administration may be fallacious from which it appears that these patients may retain or destroy more lactoflavin than normal subjects. In his experiments the author employed lactoflavin by the parenteral route in order to avoid the possibility of defects of absorption from the intestinal tract. In three cases of sprue ranging from 14–50 years it was noted that in spite of overdosage elimination in the urine showed no appreciable change and that a second phase occurs when urinary elimination is rapidly increased, corresponding with complete disappearance of faecal fat. Suprarenal extract improved the general condition but did not affect the steatorrhoea.

2. Hypo- and avitaminosis B₂.

In this instance a patient who had undergone operations on three occasions for duodenal ulcer suffered intensely from gastroenteritis then developed angular stomatitis glossitis cutaneous atrophy and disseminated pigmentation—a symptom complex described by SEBRELL and BUTLER. Here treatment with vitamin B₂ gave good results with disappearance of steatorrhoea and other manifestations.

3 Adrenal insufficiency

The theories of VERZAR on the relationship between steatorrhoea and suprarenal disturbance were considered. A patient presented symptoms of Addison's disease and steatorrhoea—a vitamin assay gave the following results—The elimination of ascorbic acid after injection remained unchanged but there was no alteration in the steatorrhoea likewise per cortone injections were without effect.

[The author considers that the action of lactoflavin can best be explained by the assumption that this vitamin occurs as a phosphorylated compound in the intestine and that in this form it exerts its effect upon fat absorption. When given by the parenteral route the phosphorylation is brought about by the reticulo-endothelial system of the liver.]

P M B

KARK (Robert) SOUTER (Alexander W) & HAYWARD (Joseph C.)
 A Haemorrhagic Diathesis in Idiopathic Steatorrhoea. Observations on its Association with Vitamin K Deficiency—*Quarterly Jl Med* 1940 Oct. n.s Vol 9 No 36 pp 247–261 With 4 figs [41 refs.]

A haemorrhagic state is rarely encountered in sprue coeliac disease and idiopathic steatorrhoea, but CASTLE did not observe any manifestations in a study of over 200* cases of tropical sprue in Porto

* The reviewer has not met with this complication (as distinct from scurvy) in a series of over 500 cases of tropical sprue.

Rico nor has any reference been made to it in infantile coeliac disease nor has it been mentioned by THAYSEN (1932) in his monograph on idiopathic steatorrhea in adults. The haemorrhagic diathesis of hypoprotrombinaemia is quite distinct from scurvy.

The patient in question, a man of 62, who had suffered for 2½ years from idiopathic steatorrhea suddenly developed a haemorrhagic tendency. Tingling and numbness of the hands and feet appeared and many large ecchymoses were noted, especially about the wrists, left elbow and right knee. The hands and wrists became swollen and discoloured and oedema of feet and ankles became apparent. On admission no perifollicular haemorrhages or purpurae were present as in scurvy. Carpopedal spasm was present while Trousseau's and Chvostek's signs were positive. No renal haemorrhages were observed. There was marked oedema of both legs extending up to the thighs. The urine contained 0.05 per cent albumin, many red blood-cells and a few white cells. Blood chemistry: serum calcium 5.0 mmm, serum phosphorus 1.6 mgm per 100 cc, serum phosphatase 16 units, total plasma proteins 3.8 gm per 100 cc. Sugar tolerance test (50 gm dextrose orally) showed a flat curve. Total fat, following intake of 100 gm of fat, 65.5 gm excreted, of which 21.4 gm consisted of neutral fat, 41.1 gm of fatty acids. The faeces contained occult blood. The blood prothrombin time was determined by Quick's method (1935) by employing the method of KARK and LUNZER (1939) (varying dilutions of normal plasma with prothrombin free plasma are set up and the Quick prothrombin time determined on mixtures containing known percentages of prothrombin). During this investigation the Quick prothrombin time of normal control plasma varied between 19 and 23 sec—the latter figure being taken as a standard (100 per cent prothrombin). With an extension of all haemorrhagic areas the coagulation time was prolonged to 20 min, the bleeding time was 5 min, the blood-prothrombin concentration was approximately 15 per cent, the blood-platelet count was 170,000 per cmm.

The patient was then given 1 mgm of 2-methyl-1,4-naphthoquinone (synthetic vitamin K) by the mouth. Twenty-four hours later the blood-prothrombin concentration was 70 per cent. That day he was given a further 2 mgm of vitamin K orally and in 24 hours the blood-prothrombin time was normal, the blood coagulation time 3½ min and bleeding time 1½ min. From this time forward there was no further extension of the haemorrhagic areas. The haematoma dramatically cleared and gross blood disappeared from the stool. Thereafter his condition remained variable after an accidental cut the prothrombin rate again fell, but was rapidly restored by further synthetic vitamin K.

During a further relapse some five months later intravenous injection of 1 cc of isotonic solution of a water-soluble derivative of vitamin K (subsequently repeated) was given, the blood-prothrombin rate was restored to normal and maintained at this level by oral administration. Experiments *in vitro* with synthetic vitamin K added to citrated plasma showed that the single addition of this substance to plasma containing reduced quantities of prothrombin failed to raise the prothrombin concentration. This would suggest that the effect of naphthoquinone in raising the blood-prothrombin concentration in patients with hypoprotrombinaemia is not the result of a single chemical reaction.

DAM (1935) described a deficiency disease of chicks which was cured by addition of a fat-soluble material to the deficient diet. This disease characterized by a haemorrhagic tendency of a haemophilic nature, was later shown by DAM SCHÖNHEYDER and TAGE HANSEN (1936) to be associated with a hypoprothrombinaemia. This returned to normal with remission of the haemorrhagic state when the fat soluble material (vitamin K) was administered. It has now been established by ALMQUIST and KLOSE (1939) that many of the naphthoquinone derivatives exhibit vitamin K activity but that 2 methyl 1 4-naphthoquinone is the most active.

In idiopathic steatorrhoea the deficiency arises as result of a combination of factors, insufficient intake impaired absorption and increased loss by excretion of vitamin K. The first is probably the most important single cause in patients in whom the fat intake has been restricted over a prolonged period. Whilst a mild vitamin K deficiency can arise in patients with steatorrhoea taking mixed diets the severe haemorrhagic manifestations of marked hypoprothrombinaemia do not occur until the patients have for long been on a fat free diet. It is therefore advisable to supplement such therapeutic alterations in diet with maintenance doses of vitamin K or one of its analogues.

P M B

BRITISH MEDICAL JOURNAL. 1941 Nov 22 pp 731-732—The Sprue Syndrome [18 refs]

MISCELLANEOUS

FRANSEEN (Clifford C) Aspiration Biopsy, with a Description of a New Type of Needle.—*New England Jl of Med* 1941 June 19 Vol 224 No 25 pp 1054-1058 With 4 figs [24 refs.]

The author describes a needle by means of which he removes portions of tumours for microscopic examination. [In principle it is very like the needle described by IVERSEN and ROHOLM *Acta Med Scandinavica* 1939 Vol. 102 p 1 which was used to remove portions



Detail of the tip of the author's needle, with the obturator withdrawn (A) and inserted (B)

[Reproduced from the *New England Journal of Medicine*]

of liver tissue in the study of jaundice, and it is perhaps possible that some such instrument may be of value in the study of yellow fever in that portions of tissue may be removed from the living subject. The

reviewer has in mind particularly the mild and atypical forms of yellow fever but realises that in such cases there may be no characteristic appearances in the liver.]

At the tip of a 14-gauge needle with the obturator in place are made three bevels, as in the figure. The needle with obturator in position, is introduced into the tumour the obturator is withdrawn and a 20 cc. syringe attached. The whole is then pushed further into the tumour by a rotatory movement, the plunger of the syringe being slightly withdrawn to create a vacuum. Pieces of tissue are easily dislodged and on withdrawal of the needle are sucked into the barrel of the syringe. They are then prepared for section, and enough is usually obtained to be of use in diagnosis. C W

GEAR (James) Tropical Diseases on the Witwatersrand.—*Proc. Transvaal Med. Off. Officers Assoc.* 1941 Feb Vol 20, No 228 pp. 53-62. 10 refs.

WINGFIELD (Alec) Hyperventilation Tetany in Tropical Climates.—*Brit. Med. J.* 1941 June 21 pp 929-930. 18 refs.]

Nearly twenty years ago in 1922, the importance of hyperventilation was recognized as a cause of tetany and in 1932 McCANCE showed that attacks of overbreathing which might almost escape casual observation, might induce tetany in certain persons. It is thought that overbreathing washes out CO from the blood and produces an alkalosis.

The author records the case of a ship engineer in good general health who in the heat of the Persian Gulf, suffered from profuse perspiration followed by tingling cramps and tetany. Thinking that the condition might have been due to hyperventilation, he was told to breathe quickly and deeply. In 2½ minutes he felt tingling in hands and feet, and in another half minute the hands developed tetany contraction *crurae & couched*. The blood calcium was only 8.3 mgm. per cent. Later similar attacks were induced in the same way.

More work on the subject of tetany and hyperventilation in tropical climates is called for. H H S

WILCOCKS (Charles) Heat-Stroke and Allied Conditions.—*Practitioner* 1941 July Vol 147 No 1 pp 463-468.

This is a brief resume of modern opinion on a subject which, in view of the conditions of mechanized warfare and of the campaigns now being conducted, is of considerable importance at the present time.

C W

LANDOR (J V) Typhoid Fever With Special Reference to the Value of New Antisera in Therapy and Eosinopenia in Diagnosis.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941 July 3, Vol. 35 No 1 pp. 1-11 (14 refs.)

This paper purports to analyse 483 cases of typhoid fever admitted to the General Hospital, Singapore in the course of an epidemic during the months May to August 1933. Thirty-seven cases were discarded on the grounds of inconclusive diagnosis. Diagnosis of the remainder

was considered proved by the occurrence of a long febrile illness associated with one or more of the following signs—a positive Widal reaction isolation of *Bact typhosum* occurrence of gross ileal haemorrhage perforation of intestinal ulcer the post mortem finding of typhoid ulceration of the bowel

Only two of the patients were Europeans and none was under two years of age. In general the clinical manifestations were severe peripheral neuritis and encephalitis being not uncommon. Other frequent complications were parotitis otitis media and pneumonia. The case fatality rate was 22 per cent toxæmia being the commonest immediate cause of death. Twenty-eight of the cases were in children under six years of age of whom only 11 per cent died. 41 boys between 7 and 12 years of age had a case fatality percentage of 17.

Treatment consisted of absolute rest in bed on a light fluid or semi fluid diet including milk. Sulphonamide was tried in a few cases, but no conspicuous benefit being noted it was not persisted with. Forty three selected cases 25 being under 14 years of age showing signs of acute toxæmia were treated with GRASSET'S anti typhoid serum the average amount given to each case being 31 cc. Of these cases 12 were fatal (27.9 per cent). Later in July and August 17 other very toxic cases 10 of the patients being between 6 and 13 years of age were given FELIX'S serum containing V_1 antibodies the average amount per case being 55 cc. Of these only one died. It is pointed out that although the last group of cases occurred towards the end of the epidemic the mortality rate amongst untreated cases during the same period showed no diminution.

Differential white cell counts were performed on 43 of the cases, and in 37 of them no eosinophils were seen. 200 cells was the usual number counted on each occasion. Control counts on 100 consecutive cases of other diseases taken at random showed no eosinophils in 31 cases. The author concludes that eosinopenia is of value in diagnosis but is not an absolute sign.

In conclusion emphasis is laid upon the desirability of compulsory anti typhoid immunization in Malaya and attention is drawn to the advantages of inoculation of small doses of typhoid vaccine by the intradermal route for the maintenance of immunity already initiated by the usual subcutaneous inoculum. In two cases immunized in this way the local and general reactions were slight while satisfactory H agglutination responses were obtained.

L. J. Davis

CABLE (K. Vigers) Tropical Ulcer of the Toes—*Jl Trop Med & Hyg* 1941 July 15 Vol 44 No 14 pp 88-89

Tropical ulcer may affect the toes proper the interdigital clefts or the nail beds. Ulcers affecting the toes especially if situated on the dorsum may involve tendon sheaths or even joint cavities. Those of the plantar surfaces rarely penetrate deeply. Most of these ulcers occur in Trinidad in those who go barefoot. Treatment is essentially the same as for ulcers in other places [see this *Bulletin* 1941 Vol 38 p 416].

Interdigital tropical ulcers occur almost exclusively in those who wear shoes and there is usually present a fungus which provides the initial lesion. The ulcers may spread dorsally along the sides of the toes or along the plantar surface.

The nail beds may be involved from a dorsal ulcer (usually in persons who wear shoes) or from an ulcer starting at the distal part of the toe and extending under the nail (almost invariably in those who go barefoot). In both cases the first step in treatment is complete removal of the nail and curettage of the nail bed. Amputation should be performed if ainhum also exists. C II

RJOU (M) La sulfamidothérapie de l'ulcère phagédénique tropical. (Sulphonamides in the Treatment of Tropical Phagedenic Ulcer)—*Rev Méd Française d'Extrême-Orient* 1940 Aug-Sept No 7 pp 342-351

The author holds the view that tropical ulcer is essentially a streptococcal ulceration of the skin, with spirochaetes and fusiform organisms as common secondary invaders. The treatment advised consists of several stages. Curettage is not always successful in cleaning the ulcer and the author prefers a method in which Dakin's solution or potassium permanganate solution (strengths not stated) or other mild antiseptic is allowed to drip on to the ulcer from a height of 50 to 75 cm at the rate of 40 to 60 drops each minute for 3 or 4 hours once or twice each day. This treatment is effective in transforming the bed of the ulcer into a clean granulating surface.

Sulphonamide drugs need not, in all cases, be given by the mouth; oral administration may be reserved for acute cases with abundant suppuration and rapid destruction of tissue. Powdered sulphapyridine may be applied to the ulcers but this method is not free from disadvantages, and is expensive. A satisfactory paste for local application is as follows—

Powdered sulphapyridine	8-10 gm.
Zinc oxide	15 gm.
Calcium carbonate	15 gm.
Cod liver oil	35 gm.
Lanolin	25 gm.

and analgesics may be incorporated if necessary. The paste is most beneficial at pH 4-8. It is applied under cellophane which provides perfect occlusion.

Skin grafts are useful; they may with advantage be covered with the sulphonamide paste.

Treatment of malaria, ankylostomiasis, avitaminosis and syphilis should be carried out if these conditions are present. For the last bismuth is preferred to mercury or arsenic when there is osteoperiostitis near the ulcer. Vitamin A and ascorbic acid are valuable adjuncts to general treatment. C II'

BRANDT (Robert) Spontaneous Healing and Progression in Untreated Venereal Lymphogranuloma.—*Veneral Dis Information* 1941 July Vol. 22, No 7 pp 248-253 [Summary appears also in *Bulletin of Hygiene*.]

Brandt suggests that since many persons who give positive Frei reactions have neither history nor symptoms of L.I. the original lesions must have healed without treatment and been forgotten. This is supported by the fact that occasionally in such cases scars are found in the groin. Also according to the author's experience in a clinic in Georgia U.S.A. patients often disappear after buboes have been

aspirated or skin tests have been performed and they would have returned if the lesions had not resolved. He re-examined 41 untreated cases and found that 16 showed evidence of healing 25 remaining uncured. He considers that the 16 do not represent the true proportion of the spontaneously healed cases since the majority of such disappear from observation and these were only cases specially called up to the clinic or found accidentally. He gives details of the 16 who were examined from 2 months to 4 or more years after first being seen. In 8 of them there was no scar and in 7 only a scar and the skin reaction remained as evidence of the infection. In the 16th case 3½ years after the first appearance of the disease the glands remained swollen and matted together. The author points out that all the 16 cases had had buboes and he thinks that the absence of bubo diminishes the tendency to spontaneous healing. This view is supported by the fact that of the 25 patients who showed no sign of healing only 11 had had buboes. 14 had ulcers or early elephantiasoid changes when first seen. A history of bubo is uncommon in rectal stricture a fact which the author says is not accounted for by the alleged rarity of bubo in women. TORPIN *et al* in a series of 97 consecutive cases of L.I. in women found evidence of bubo in 33. On the other hand in 42 women with rectal stricture only 3 gave a history of bubo. In Brandt's clinic of 46 women with L.I. 32 had buboes and 14 had ulcers with little or no involvement of the inguinal glands. The author considers that evidently the bubo affects the healing of lesions in other parts of the body witness the healing of the genital ulcer as soon as the bubo appears. It is evident also that early acute inflammation other than bubo has the same effect though in smaller degree as most rectal strictures develop without any early preceding manifestation. Of two untreated males with penile lesions but no bubo one developed elephantiasis and the other a progressive destructive ulcer. The spontaneous healing of L.I. lesions has to be kept in mind in evaluating therapeutic measures. L W Harrison

STEYN (Douw G.) *The Poisoning of Human Beings by Wild Plants, Ornamental Plants and Domestic Poisons.*—*Public Health* Johannesburg 1941 June Vol 5 No 4 pp 13-14 16 18 20-23 25-6 With 17 figs

The author does not deal in any great detail with the many poisons he mentions. He divides them for purposes of description into Poisonous garden plants wild plants and weeds fruits and vegetables and domestic poisons. The first two groups only are of interest to readers of this *Bulletin* in fact the reasons for including the latter two are not clear. Under fruits and vegetables he speaks of gastro-intestinal disturbances in children set up by their eating unripe melons cucumbers green apples and the like and under domestic the inadvertent ingestion of beetle powders containing phosphorus or arsenic of solid fuel meta of the swallowing of Pharaoh's serpents (mercury sulphocyanide) of licking the paint of toys which we all are well aware of from the fate of little Willie with his monkey instilled into us as a warning in our nursery days.

Some of the first two groups do not call for more than a passing remark here as they are well known to tropical workers and their effects and treatment are to be found in standard works such for

example as *Verum oleander* *Jatropha curcas* (physic nut) *Stramonium* (*Datura*) *Ricinus* and *Solanum* Others less well known, call for mention

Melia azedarach (Lilac tree) known also as China berry *Syringa* berry Cape syringa Fatal poisoning has occurred from eating the berries the symptoms being those of gastro-enteritis, with palpitation and dyspnoea

Colocasia antiquorum (elephant ear so called from the large leaves) is a verandah plant and children sometimes eat part of a leaf and suffer from burning sensations in the mouth with vomiting and diarrhoea

Adenia digitata a creeper with large subterranean bulbs and yellow fruits tinged with red It is distributed fairly widely in the Transvaal Zululand and Natal The bulbs contain a glucoside which forms hydrocyanic acid and moderate an irritant protein poison they produce symptoms of gastro-enteritis-nausea vomiting diarrhoea with passage of blood—weakness of the heart action laboured breathing paralysis ending in death Similar symptoms follow poisoning by the leaves and roots of *Acocanthera spectabilis* (Bushman's or Hottentot's poison bush) a plant common along rivers and sluts in parts of the Transvaal Natal and Eastern Cape Province The fruit is deep purple, like a plum

Solanum nigrum (Black Nightshade) used as emetic and by the natives for the treatment of headache wounds skin diseases, malaria blackwater fever and other conditions Blue-black berries are used in cakes, but green berries are poisonous The toxicity of poisonous species of *Solanum* decreases as they ripen (compare the Akee fruit, *Blighia sapida* in the West Indies and Nigeria)

Euphorbia ingens *Candelabra euphorbia* (Naboom bush) contains an irritant latex which causes vesication of the skin and oral mucosa and may prove fatal Cattle which have run through a dense patch of naboom bush suffer from most severe eye-burn, while the skin on their faces is almost completely destroyed

Senecio discifolius bread poisoning occurs as a poisonous weed on wheat lands, is harvested with the wheat and so finds its way into bread (hence the name Bread-poisoning) [See Bull of Hyg. 1938 Vol. 11 p. 849 1937 Vol. 12 p. 896, and this Bulletin 1941 Vol. 38 p. 421] H H S

PRUIS (G W A) Gadoengvergiftiging? [Gadoeng Poisoning?]
Geneesk Tijdschr v Neder Indië 1941 Apr 22 Vol. 81
 No 16 pp 884-873 English summary

Gadoeng is the local name for *Dioscorea hispida* a plant which grows wild in Java and whose bulbs are edible [Another species *D. hispida* occurs in the Philippines and is not infrequently a cause of food poisoning (see this Bulletin 1938 Vol. 35 p. 78)] The Javan tuber is known to be poisonous and the toxic substance (which is not known) is supposed to be removed by shaving the bulbs soaking them for 3 days, then rinsing in running water for two more days [The toxic principle may be a cyanogenetic substance for this mode of preparation is analogous to that of cassava] The product is dried, and before use is again soaked and steamed and eaten with rasped coconut

Incidentally the plant is used in the treatment of syphilis. The present case is of a girl 18 years old who after eating the tuber was seized with vertigo vomiting and diarrhoea with passage of blood

in vomit and faeces she complained of burning pain in throat oesophagus and stomach she also had anuria with dropsy and was dazed Decapsulation was performed and for a short time afterwards the dropsy increased then the passage of urine became normal and the dropsy decreased and the mental condition cleared up No special treatment was given but the diet consisted mainly of fruit and glucose Little is known concerning this poisonous food and the author regards this as a probable case only and queries the title H H S

YANG (R T) Some Clinical Observations and Opinions on the Subject of Atriplicism.—*Japanese Jl Dermat & Urol* 1940 Nov 20 Vol. 48 No 5 pp 103-106

There is much that is obscure on the subject of atriplicism When MATIGNON first described the condition in 1898 he noted that he had seen more than 20 cases in persons who developed the symptoms after eating the shoots of *Atriplex serrata* (one of the Chenopodiaceae) and he consequently regarded the condition as a form of food poisoning and called it atriplicism The main symptoms are facial oedema oedema of hands and forearms disturbance of motility sensation and trophic lesions of the skin affected and the formation of crusts over the oedematous areas The symptoms could be divided into four stages 1 Infiltration 2 Ecchymosis in the temporo-malar region with maceration of the epidermis 3 Maceration and ulceration of the skin of the hands 4 Scarring and keloid formation

It was seen chiefly in Mukden in May-July the hottest months and among the poorer classes who took the shoots for food The author regards atriplicism as a bad name at all events it should not be applied until more is known of the disease. The symptoms may arise in those who have eaten not *Atriplex* but *Amaranthus* or *Korchia* they may not arise in those who have eaten *Atriplex* unless they expose themselves to bright sunlight they may be due to a small greenish yellow mite which is found on the plant and, according to LAVERAN the thumb and forefinger become infected when plucking the herb and the infection is carried thence to the mouth and face Since it occurs in those eating the food who may have had no part in gathering it the parasitic theory has now little support

The author tried to infect himself and between 20 and 30 volunteers by feeding on chenopodium but without effect One patient had often eaten it but was not affected until she exposed herself to the sun's rays during working hours when the symptoms developed typically Since the lesions appear only on exposed parts and never on those which are covered, the author believes that the immediate cause is irritation due to the sun's rays though the question of sensitization to sunlight by ingestion of the herb needs consideration and study [See this *Bulletin* 1928 Vol. 23 p 219] H H S

MACGREGOR (R. G. Scott) & LOH (G. L.) The Comparison of Basal Physiological Values in Racial Groups Part 2 Erythrocytes, Haemoglobin Content and Cell Count.—*Jl Malaya Branch Brit Med Assoc* 1941 Mar Vol 4 No 4 pp 385-404 With 2 figs [46 refs.]

Erythrocyte counts and haemoglobin values were determined in physically fit males in the tropics The groups were 90 Europeans 60 Chinese, 70 Malays 70 Northern Indians and 60 Southern Indians,

The means lay within the range of normal standards in temperate climates. The haemoglobin was significantly higher in the European group and at the same time the erythrocyte count was significantly lower than the mean corpuscular haemoglobin was higher in the European than the Asiatic groups. No significant differences were found between the various Asiatic groups. Twelve Europeans were tested monthly for six months after their arrival in the tropics and they showed no variation in either haemoglobin or red cell count. No indication was found of increase or decrease in these values during residence for longer periods. [The literature and the various factors which might affect the blood picture are discussed]

W. P. Kennedy

MACGREGOR (R. G. Scott) & LOH (G. L.) The Comparison of Basal Physiological Values in Racial Groups. Part 3. Leucocytes. (Total, Differential and Polynuclear (Armeth) Cell Counts.)—*Jl Malaya Branch Brit Med Assoc* 1941 Mar Vol 4 No 4 pp 405-437 With 2 figs [49 refs.]

Total and differential white cell counts and polynuclear counts (i.e. the modified Armeth count of Cooke and Ponder) were made from physically fit male groups in Singapore. These comprised the same five groups and the same numbers as in the preceding abstract. The means were within the range of the normal standards determined by the most critical research in temperate climates. Studies of individuals at different periods suggested that there is a reduction of polymorphs and a relative increase in lymphocytes as a result of environmental influences. When eosinophilia occurs in apparently normal persons these cells appear to replace neutrophils quantitatively and no leucocytosis occurs till the eosinophils exceed 20 per cent. The weighted mean of the polynuclear count for 90 Europeans was 2.17 which is significantly different from the British standard of 2.74 established by Cooke and Ponder. The other groups showed even greater shifts to the left. The mean for 20 Chinese was 1.88 for 50 Malays 1.85 for 40 Northern Indians 2.05 and for 20 Southern Indians 2.11. This confirms the observations of other workers who have reported left handed counts in tropical countries. [The techniques in both this and the preceding paper are described in detail and have been carried out with all precautions. The data are fully set out in extended tables. There is not however a detailed discussion of the climate which in view of other work, would have been an advantage.]

W. P. Kennedy

GORDON (R. M.) The Jigger Flea.—*Lancet* 1941 July 12 pp 47-49 With 5 figs [18 refs.]

The paper gives a valuable summary on a matter of considerable topical interest. It should be read in the original, by medical men serving in Africa.

The jigger flea (*Tunga penetrans*) is widely spread in the American and African tropics. The egg hatches (as in other fleas) into a footless larva which lives in dust and feeds on organic debris. When full fed the larva spins a cocoon around itself and turns into a pupa inside it from which the adult flea emerges. If the flea is a female she

burrows head first into the skin of man pig etc commonly in the human toe At first she appears in the skin as a tiny dark spot which itches later owing to development of the ovaries she becomes very greatly enlarged

The paper emphasizes the great importance of chiggers to armies and others. If neglected or carelessly extracted very serious ulcers may result and large numbers of men may be incapacitated The pest is reduced by sweeping floors clean or treating them with kerosene emulsion by foot inspections and the training of subordinate personnel in the method of extraction and by wearing shoes at all times

P A Burton

OMORI (Nanzaburo) Comparative Studies on the Ecology and Physiology of Common and Tropical Bed Bugs, with Special Reference to the Reactions to Temperature and Moisture—*Taiwan Igakkaï Zasshi* (Jl Med Assoc Formosa) 1941 Mar & Apr Vol 40 Nos. 3 & 4 pp 555-636 647-729 With 19 figs [5 pages of refs.]

The author observed that in Formosa the tropical bed bug *Cimex hemipterus* alone is present while in Japan proper only the temperate bed bug *C lectularius* occurs He therefore undertook a detailed comparison of the physiology of the two species which is here reported very fully *C lectularius* seems to be a more prolific species less influenced by temperature But he confirms the conclusions of others that *C hemipterus* is more resistant to high temperatures it will continue to breed at 36°C whereas *C lectularius* will not *C lectularius* is more resistant to low temperatures it is little affected by temperatures as low as 3°C while *C hemipterus* soon dies at temperatures below 9°C and at temperatures slightly above this its metabolism is more markedly depressed. If the species are released simultaneously on a graduated temperature plate the tropical species aggregates chiefly around 32-33°C the temperate species at about 28-29°C Low temperatures seem to affect particularly the fertility of the female high temperatures of the male

In general the author's results support the conclusion that whereas *C hemipterus* cannot thrive outside the tropics or subtropics *C lectularius* is adaptable to tropics and temperate zones alike The two species mate readily but the eggs so produced are abnormal and infertile Further the sperm of male *C hemipterus* seem to have an injurious effect on the female *C lectularius* The author suggests that this may be a possible explanation for the exclusion of the latter species in Formosa The geographical distribution of the two insects is reviewed

V B Wigglesworth

ALAMEDA COUNTY Annual Report for 1940 of the Alameda County Mosquito Abatement District [GRAY (Harold F) Engineer]—34 mimeographed pp With 6 figs

LYFORD (Helen Stewart) Some Reactions of a Pathogenic Flagellate, *Trichomonas foetus* to Environmental Changes in Bacteria-free Cultures—*Amer Jl Hyg* 1941 May Vol 33 No 3 Sect C pp 69-87 With 5 graphs. [22 refs.]

The paper gives the results of a careful study extending over two and a half years of the cultural requirements of *Trichomonas foetus*

when grown in bacteria free media. The flagellates were maintained in tubes containing whole egg slants covered with a mixture of defibrinated blood and simple saline solutions (s-e-b medium). The cultures were kept at 37°C and subcultures were made every 10 days. Such cultures were suitable for transfer to a liquid medium such as dextrose serum broth mixtures. The egg slant cultures were capable of several months survival if the tubes were rubber-capped and kept at laboratory temperature. With these cultures it was possible to study the influence of temperature, the rate of growth and multiplication, the effect of changes in the pH of the medium, the optimum concentration of serum in the medium and other biological characteristics of the flagellate. The results under these various headings are described and discussed in the paper which must be consulted by those interested.

C. M. WENYON

LUSAKA HEALTH DEPARTMENT Compiled by Common Sense and
the Rationing of African Labourers.—4 pp Not dated

In this pamphlet are set out arguments which indicate that adequate nutrition of African labourers is desirable from the point of view of results obtained and of economy. Specimen diets are given of which the following is the most comprehensive —

"D"—As recommended by a Conference of Medical Directors.

Daily	
(a) Maize meal	28 ounces
(b) Beans, peas or belled peanut	4 "
(c) Palm oil or animal fat	2 "

Weekly	
(d) Meat	2 lbs.
(e) Vegetables	2 "
(f) Salt	3½ ounces

Daily	
(a) Maize meal	2 lbs.
(b) Beans etc	4 ounces
(c) Palm oil or animal fat	2 "

Weekly	
(d) Fish	2 lbs.
(e) Meat	2 "
(f) Salt	3½ ounces

Daily	
(a) Millet or Ka'fir corn	32 ounces
(b) Beans etc	4 "
(c) Groundnut oil or butter	2 "

Weekly	
(d) Biltong	1½ lbs.
(e) Beans or peas germinated	14 ounces
(f) Salt	3½ "

Note. Any item in these three alternative diets may be substituted for one with the same letter in either of the other two e.g. (d) Biltong may replace (d) Fish.

The addition of 2 lbs. of bone meal to a bag of meal is recommended.

There is a note on red palm oil which in its crude state is a potent source of vitamin A and one on native beer which is stated to contain appreciable amounts of vitamins B and C.

C. H.

CENTRAL MINING—RAND MINES GROUP HEALTH DEPARTMENT
REPORT FOR YEAR 1940 [THOMPSON (H Q F) Acting Chief Med.
Officer] pp 22-28 With 14 figs—Housing of Non-Europeans.
[Summary appears also in *Bulletin of Hygiene*]

In recent years the housing of native labourers has been improved largely as a result of efforts to guard against respiratory diseases especially pneumonia. As the improvement in housing has progressed so the mortality from pneumonia has steadily decreased. Plans and elevations are given of 14 compound rooms or houses. The old type of compound room housed 24 natives and when this type was in common use the mortality from pneumonia was 12.3 per 1 000 *per annum* (the figure for 1940 was 0.63 per 1 000). Later an attempt was made to reduce morbidity by constructing sleeping berths of concrete and providing concrete partitions which prevented the transmission of mouth spray on coughing or sneezing between the sleepers. These were a great success and form the basis of the modern rooms. Later still the rooms were built to take 10 men but a living and sleeping room for 20 has now been standardized. Designs for houses for married men are shown some of which contain three rooms a kitchen a shower bath a water closet and verandahs. Information is given as to cost and materials used.

[This account could be read with advantage by all who are concerned with the housing of native labourers. The diagrams are beautifully reproduced.] C II

DALEAS (Pierre) *Essai sur l'assistance sociale aux femmes enceintes et aux nourrissons au Tonkin* [Maternity and Child Welfare in Tonking]—*Reu Méd Française d'Extrême-Orient* 1940 Aug-Sept No 7 pp 309-341

This paper by the Professor of Obstetrics in the School of Medicine in Hanoi deals in a comprehensive manner with maternal and child welfare in the Tonking province of Indo-China.

Figures for mortality rates are given and the causes of the mortality discussed. There follows an account of the welfare work which is being done and of the results so far obtained. Finally suggestions are made for a programme of future action.

In Hanoi still births which were 61.6 per thousand births in 1925 fell to 29.09 in 1938 syphilis was held responsible for 38 per cent of these stillbirths. Neo-natal mortality which was 175 per 1 000 births in 1925 fell to 33 in 1938 syphilis causing 49 per cent of the mortality. Deaths of infants up to one year which were 435 per 1 000 births in 1925 were 190 in 1938. It is considered that 60 to 70 per cent of these deaths after the first three weeks were due to gastro-intestinal affections.

From a survey made in certain rural areas it was found that still births there were much greater than in the town of Hanoi while infant mortality was less. (The areas surveyed were non malarious.)

Adverse social factors are considered responsible for much of the child mortality: ignorance harmful social customs unsanitary over crowded houses poverty malnutrition and too many pregnancies in debilitated, underfed and overworked mothers.

Many infants are born prematurely (126 per 1 000 births in Hanoi Maternity Hospital) the two chief causes being syphilis and debility of the mothers.

Of measures already taken to combat the high mortality the following are noteworthy. Maternity hospitals have been built in the larger towns and in several lesser centres in the provinces in these 18 133 confinements took place in 1938. Trained midwives are gradually increasing in number and in influence but as yet practise mainly in urban areas. A Health Visitors Training School has recently been opened in which local girls are being trained.

In rural areas where it is not as yet possible to supply sufficient trained midwives an interesting temporary arrangement has been adopted which it is claimed has proved highly successful. The chiefs of the villages select young women with a certain amount of education who are given simple and practical instruction in the aseptic conduct of a confinement and in the recognition of abnormalities. These girls must subsequently work in their own villages, they are given small maternity homes with a few beds. These are maintained and the salaries of the girls paid from village funds. In 1938 there were 755 of these girls in practice and they attended 85 353 confinements.

Of voluntary organizations concerned with child welfare grateful appreciation is given to the help rendered by the *Fraternité franco-indochinoise* organized by Madame le Général CATROUX.

In the programme for future action the following suggestions are made: extension of general sanitary measures such as slum clearance, better drainage and better diet for the people especially as regards nitrogenous food; increase in maternity and child welfare centres; training of more native health visitors especially polyvalent health visitors; education of the general population in hygiene; increase in anti-venereal work; and co-ordination of all societies concerned with the care of mothers and children through one central committee.

The author points out the great difference in child welfare in India and China from that in western countries and explains how circumstances and a study of the magnitude of the problem are forcing the authorities to neglect somewhat the unfit in order to bring their greatest efforts to bear on keeping fit children healthy.

J. G. Blacklock

REVIEWS AND NOTICES.

CRAIG (Charles Franklin) M.D. M.A. (Hon.) F.A.C.S. F.A.C.P.
Col. U.S. Army (Retired) D.S.M. etc.] & FAUST (Ernest Carroll)
[M.A. Ph.D. etc.] *Clinical Parasitology* Second Edition
thoroughly Revised—772 pp. With 244 figs. 1940. Philadelphia
Lea & Febiger (51s.)

This seven hundred page text book is the successful product of the collaboration of two well-known American workers. After a general introduction by the junior author each author deals with the subject lying more particularly in his own sphere of knowledge. C. F. Craig is responsible for the sections on Protozoan and Protozoan Infections, and E. C. Faust for those on Helminths and Helminthic Infections, and on Arthropods and Human disease. Each subscribes the appropriate portion of the Technical Appendix of fifty pages at the end of the book.

The matter in the text is lucid and is amply illustrated with excellent line drawings and photographs. Each parasite after its zoological status has been discussed and described is covered in a systematic manner in a series of paragraphs giving its synonymy, history and nomenclature, geographical distribution, morphology, life cycle and method of reproduction, cultivation, epidemiology, methods of transmission, pathology and symptomatology, diagnosis, prognosis, treatment and prevention where these are appropriate and justified by the importance of the parasite. A pleasing proportion has been maintained throughout in the difficult task of assessing the space devoted to each parasite. The field covered is very extensive but is strictly limited to the parasites which have been reported from man and the bibliography is adequate and cosmopolitan. In short, *Clinical Parasitology* may be recommended as an excellent text book for undergraduate and graduate students of human parasitology wherever the English tongue is spoken.

A R D Adams

MARTINDALE *The Extra Pharmacopoeia* Twenty Second Edition in Two Volumes Vol 1 pp xxxviii+1289 1941 London The Pharmaceutical Press Bloomsbury Square W C 1 [27s 6d]
[Review appears also in *Bulletin of Hygiene*]

Although this new edition of the *Extra Pharmacopoeia* makes its appearance almost two years after the outbreak of war it retains its international outlook and maintains the high standard of comprehensiveness and accuracy which users have come to expect of it. To make room for the inclusion of over two thousand new abstracts of the literature of the four and a half years which separate this edition from the previous one nearly sixty per cent. of the matter has been re-set. Of the re-set material by far the greater part is new to the book and almost every page bears evidence of careful revision.

Some changes within the general framework mark developments in recent knowledge. Thus Ascorbic Acid, Aneurine Hydrochloride and Calciferol which formerly appeared as subsidiary substances under such arbitrary sections as *Aurantium*, *Cerevisiae Fermentum* and *Oleum Morrhuæ* have been promoted to the status of principal or parent substances and are now placed in their own respective alphabetical positions in the *Materia Medica*. Among new sections is one of 37 pages devoted to *Sulphanilamidum*.

Much information bearing on war problems has been amplified. The section on Blood Transfusion has been expanded from 3 to 10 pages and that on Vaccines, Sera, Toxins and Antitoxins from 63 to 84 pages. The note on Ligatures and Sutures has been entirely re-written.

The up-to-dateness of the revision is noticeable. Under the headings *Acidum Tannicum* and *Azorubrum* recent modifications in the technique for the treatment of burns with tannic acid and with gentian violet respectively are described, the now recognized risk of constriction or distortion when tannic acid is used for burns of the face and hands is stressed and mention is made of the growing preference for gentian violet especially for first-aid use. The still more recent tendency to avoid even gentian violet for burns of the face and hands and to rely on saline dressings, sulphanilamide powder and *Tulle Gras* finds mention in the section on *Sulphanilamidum* and

in that dealing with Gossypium and Other Allied Dressings. Under Chlorinum, a British Standards Specification for Bleach Ointment, or Anti-gas Ointment No 1 is given. As opening up an interesting new field of research reference is made to Penicillin, a substance extracted from cultures of the mould *Penicillium notatum* which has recently been found to possess an extremely potent bacteriostatic action even in high dilutions.

The usefulness of the Therapeutic Index of Diseases and Symptoms has been increased by adding to each entry relative to a medicinal substance a note of its appropriate page number in the body of the book, thus enabling those using the Index to run quickly through all the medicinal substances mentioned throughout the book in connexion with the treatment of any particular ailment.

The collation of the vast accumulation of material for inclusion in the *Extra Pharmacopoeia* must present a most formidable task to the Editor and his assistants and they and the Revision Committee are to be congratulated on the outcome of their work. R. L. S.

TROPICAL DISEASES BULLETIN

Vol. 39]

1942.

[No 2

SUMMARY OF RECENT ABSTRACTS *

II YELLOW FEVER

Epidemiology Animal reservoirs

FINDLAY (p 431) defines the yellow fever area in Africa as shown by the mouse protection test. The limit is from the west coast at latitude 15°N along the southern border of the Sahara to the Blue Nile thence along the Sudan Abyssinian border to western Uganda and along the Congo. There may, however, be foci in western Abyssinia.

In the *East African Medical Journal* (p 432) there is mention of the epidemic of yellow fever which broke out towards the end of 1940 in the southern Sudan and in which over 15 000 cases with 1 600 deaths were reported. There is strong evidence that the infection has long been present in the Sudan and that it is still present in every region where mouse protection tests have given positive results.

SICÉ and BROCHEN (p 66) report three cases from the French Sudan. These occurred in jungle country from which cases have previously been reported and this fact supports the view that there may be an animal reservoir in that region. SALEUN (p 432) reports a few cases and a few positive protection tests from French Equatorial Africa during 1939. One chimpanzee and one cow gave positive protection tests. CANTON (p 65) gives an account of yellow fever in Dakar. Many of the outbreaks during the last 150 years are said to have originated in Sierra Leone and the Gambia, and in the most recent in 1937 the disease was propagated along the Dakar-Niger railroad.

SMITH (p 66) has found yellow fever immune bodies in the sera of 32 of 100 sheep examined by the mouse protection test from Kano, N. Nigeria. He inoculated sheep which had no protective bodies with suspensions of neurotropic yellow fever virus and in some instances symptoms similar to those caused by the rabies virus were produced. The virus survived for at least 13 days in the animals' brains, and sheep to sheep passage was effected. The animals developed immune bodies which gave protection to mice. The author concludes that the

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

immune bodies found in sheep in Nigeria and Kenya probably develop as a result of acquired, and not natural immunity but it is not yet certain that infections other than yellow fever cannot produce them.

From British Guiana SWEATE (p. 67) reports that recent protection tests on human sera show that certain areas are more important than others as foci of the disease and that, since some of the positive sera were found in children, yellow fever is endemic in the hinterland.

Dr. ASSUMPTIO (p. 433) reports that with the protection test in which the material was inoculated intraperitoneally into the Brazilian house rat (camondongo) positive results were obtained in 56.8 per cent. of 139 persons from areas of the State of São Paulo in which there was an epidemic of jungle yellow fever in 1937-38. Most of the sera were from patients who had had the disease or who were suspected of having had it. Dr. FONSECA (p. 66) found that the blood of the monkey *Alouatta fusca* (the red howler monkey) after infection with the strain of yellow fever virus, was infective for Swiss mice during the period 8-14 days after the infection but that no symptoms or signs of the disease could be found in the monkey during life or at autopsy. Dr. FONSECA and VITTIAS (p. 67) found the monkey *Cebus curripir* in Botacará, São Paulo, to be susceptible to infection with the Asibi strain. The monkeys responded with pyrexia, but did not die and the virus could be isolated from the blood on the fourth but not on the ninth day.

BROGHER *et al.* (p. 434) have tested the susceptibility to yellow fever of man-imals in eastern Colombia. Multiplication of the virus in the blood produced no obvious signs of illness in any but circulating virus was found between the fourth and ninth days after infection in 17 per cent of the animals. Protection tests were positive in 23 per cent. Antibodies are not usually transmitted by mothers to offspring through the placenta or the milk. Results obtained in *Didelphys marsupialis* captured during and after an outbreak of jungle yellow fever indicate that these animals must play some part in the epidemiology of the disease.

BROGHER (p. 434) in giving an account of the methods used and precautions taken in the examination of sera of wild animals in Colombia, makes the point that animals in which the virus may circulate without causing illness and which are therefore free to roam, constitute a greater danger to man and other animals than those which are rendered somewhat ill or are killed by the disease. He defines a susceptible animal as one in which the virus can multiply irrespective of its effect on the host. In discussing the mouse protection tests he points out that variation in the susceptibility of the strains of mice employed is a factor to be taken into account and that calculation of the amount of virus to be used can only be made after desiccation. In control tests, a pool of known immune serum is used, but it was found that after being kept for almost two years, such a pool showed a definite decline in antibody titre.

Antibody activity sufficient to protect half the mice used, was found in a pool of human serum from persons thought to be non-immune and it was found that certain animals showed definite non-specific anti-virus activities. Of these the domestic pig and the peccary are examples, but they are susceptible to infection with the virus in protection tests, therefore larger doses of virus are needed for these animals than for others. The buzzard also shows anti-virus properties.

The same author (p 437) finds that Swiss mice less than nine days old are as susceptible to subcutaneous injection of yellow fever virus as adult mice are to intracerebral inoculation when both neurotropic and viscerotropic strains are used but that the difference in incubation period between the neurotropic and viscerotropic strains is not shown when the subcutaneous route is used in the young mice In transmission experiments it was observed that infected *Aedes aegypti* could infect these young mice by bite even when the mosquitoes did not so far as could be seen withdraw any blood

Actiology Transmission

PICKELS and BAUER (p 69) give the results of a study of the physical properties of the yellow fever virus.

FINDLAY and MACCALLUM (p 68) report on attempts to grow the attenuated viscerotropic strain of yellow fever virus known as 17 D in a variety of media Success was only achieved in Tyrode media containing certain living tissue cells fowl or mouse embryonic tissue human placental tissue or the tissue of mouse carcinoma or sarcoma but no growth occurred with adult mouse brain tissue or that of larval *Aedes aegypti* nor with fowl embryo cells heated to 56°C for 30 minutes nor in media lacking living cells but containing amino acids or digested cells Living *Bact coli* or yeast cells failed to support growth The virus grew in the absence of serum and glucose. The authors suggest that viruses possess few or no enzymes of their own and are forced to borrow enzyme systems from the living cells they parasitize The same authors (p 68) have found that the passage of 8-10 bubbles of oxygen each minute through the culture media permits the use of at least 30 cc. of medium in place of the usual 5 cc and thus reduces the labour involved in the growth of large quantities of the virus No change in the pathogenicity of strain 17 D has been found by this method, and the titre is maintained The same procedure is successful with certain other viruses.

FOX and GARD (p 69) show that the duration of activity of dried yellow fever virus is inversely proportional to its residual moisture content With storage in air at 4°C. the critical moisture content is between 4 and 5 per cent. Keeping qualities are improved below this critical moisture content if the material is sealed in nitrogen or in a vacuum. These results suggest that the inactivation of the virus is at least in part the result of an oxidation reaction

FINDLAY (p 431) states that the only mosquito found infected in nature in Africa is *Aedes aegypti* though several others the names of which are given may transmit the disease by bite in the laboratory Only in the region of Malakal in the southern Sudan is there epidemiological evidence to suggest that *Taeniorhynchus* (*Mansonioides*) *africanus* may act as a vector

Control

For the control of yellow fever in East Africa a conference held in Nairobi (p 432) considered that it was of paramount importance to eliminate *Aedes aegypti* from all seaports steamships and dhows on the coast and on lakes Victoria and Tanganyika and from all inland towns aerodromes and premises near railways Certificates of immunity or of non-exposure should be required of all travellers from infected

areas, and all persons likely to travel by air in Africa should be vaccinated. LU VAN (p. 70) gives an account of measures to control *Aedes aegypti* in Florida. Repeated painstaking house inspections must be made to eliminate all possible breeding places in artificial containers. Gambusia is useful in dark drinking water cisterns the fish being first kept overnight in water chlorinated to 0.1-0.15 parts per million residual chlorine. The spraying of houses with pyrethrum extract in oil is employed, and breeding is controlled in piles of old motor car tyres by spraying with Paris green and in cemetery vases by pellets of Paris green. It is noted that eggs of *Aedes aegypti* laid in wooden egg troughs remained viable for one year during which period there had been no frost.

NAPIER (p. 437) gives an account of the precautions taken to prevent the entry of yellow fever into India. These follow the usual lines and include a quarantine period of nine days which must elapse before air passengers from infected areas are allowed freedom. In no circumstances is virus allowed to be imported even by laboratory workers.

CANTON (p. 65) describes the organization of the public health service in Dakar as regards prevention of yellow fever and mentions the method of vaccination simultaneously against yellow fever and small pox. SMITH *et al.* (p. 70) report that in Colombia, from 1937 to 1940 175 498 persons were vaccinated with virus 17D. Of 2,139 examined up to two years after vaccination almost 90 per cent were found to be immune.

Charles W. Slocums

YELLOW FEVER

ROCKEFELLER FOUNDATION. A REVIEW FOR 1940 [FOSDICK (Raymond B.) President]. pp. 27-31. With 2 figs.—Unravelling the Yellow Fever Mystery

In this brief note a reference is made to the recent outbreak of yellow fever in the Nuba mountains of the Sudan which, it is stated, was probably transmitted by *Aedes aegypti* although there is a bare possibility that other vectors were involved [see below].

In recent work on jungle yellow fever in South America it has been shown that in wild animals inoculated with the virus no illness is as a rule produced, but the virus is present in the circulating blood while the animals are running about, a condition especially favourable to the spread of the virus. Several groups of animals are susceptible, the chief of which are—

- Primates man and monkeys.
- Marsupials the opossums, all species.
- Edentates anteaters, sloths, armadillos.
- Rodents agouti, paca, capybara, some species of mice.

Certain generalizations are made—
 "1 Yellow fever is primarily a disease of jungle animals. The classical form involving transmission from man to man by the *Aedes aegypti* mosquito is more of a secondary cycle depending largely upon conditions of population concentration and mosquito breeding created by man himself.

2. Transmission of jungle yellow fever appears to be by jungle mosquitoes from animal to animal.

3. There is no animal reservoir of virus in the usual sense. Virus continues to circulate in the blood of susceptible animals for three or four days only and does not subsequently reappear. Mosquitoes however once infected tend to harbour the virus for the remainder of their lives which may be several months under favorable conditions.

In jungle yellow fever vaccination is the most important control measure but it is pointed out that the great value of control of *Aedes aegypti* in urban areas has been in no way diminished and that if this mosquito were controlled in towns the risk of transmission of the disease to East Africa, India and the Orient in these days of fast travel, could be avoided. C II

FINDLAY (G. M.) The First Recognized Epidemic of Yellow Fever.—*Trans Roy Soc Trop Med & Hyg* 1941 Nov 29 Vol 35 No 3 pp 143-154 [27 refs.]

FINDLAY (G. M.) The Present Position of Yellow Fever in Africa.—*Trans Roy Soc Trop Med & Hyg* 1941 Sept 9 Vol 35 No 2 pp 51-72. With 2 maps [18 refs.] Discussion pp 72-78 [SMITH (Hugh H.) MACKIE (F. P.) GILL (G. A.) STANNUS (H. S.) RICHARDSON (D. T.) MENZIES (T.) HEWER (T. F.) & FINDLAY (G. M.)]

An interesting summary of the position of yellow fever in Africa including its present distribution, epidemiology, the possible spread of the disease and methods of control. Whilst the paper deals mainly with observations that have been published previously it should be read in its entirety for the results are discussed especially from the point of view of the difficulties which must be overcome if yellow fever is to be successfully controlled and its spread to India and the Far East prevented.

The present distribution of the disease is summarized in two maps showing in the first map the area in which positive results have been obtained with immunity tests to yellow fever and in the second one the area in which actual cases of the disease have been recorded between 1921 and 1941. It will be seen that the endemic area involves most of the central part of the continent starting on the West Coast and extending across to at least the Sudan Abyssinian border. In order to determine changes in these endemic zones it is important to make repeated immunity surveys every 5 or 10 years. The value of these is shown in the case of Malakal where the first survey in 1933 gave only one positive out of 50 whilst a second survey in 1938 gave 21 positive out of 114. The most peculiar feature of the distribution of yellow fever is the occurrence of isolated cases without any apparent relationship to epidemics. In Freetown where no case had occurred since 1910 a single European official died of yellow fever in 1935 and no other cases could be found in the neighbourhood.

As in South America it is possible to distinguish three epidemiological types of yellow fever showing respectively urban epidemicity, rural epidemicity and rural endemicity.

Typical urban outbreaks occurred in Lagos in 1925-26, in Bathurst in 1934-35, in Accra in 1926-27 and again in 1937. In all these outbreaks *Aedes aegypti* would seem to be the sole vector.

The most striking rural epidemic ever recorded in Africa is that which has recently occurred in the Anglo-Egyptian Sudan [see below p. 69].

areas and all persons likely to travel by air in Africa should be vaccinated. LE VAN (p. 70) gives an account of measures to control *Aedes aegypti* in Florida. Repeated painstaking house inspections must be made to eliminate all possible breeding places in artificial containers. *Gambusia* is useful in dark drinking water cisterns, the fish being first kept overnight in water chlorinated to 0.1-0.15 parts per million residual chlorine. The spraying of houses with pyrethrum extract in oil is employed, and breeding is controlled in pales of old motor car tyres by spraying with Paris green and in cemetery vases by pellets of Paris green. It is noted that eggs of *Aedes aegypti* laid in wooden egg troughs remained viable for one year during which period there had been no frost.

NAPIER (p. 437) gives an account of the precautions taken to prevent the entry of yellow fever into India. These follow the usual lines and include a quarantine period of nine days, which must elapse before air passengers from infected areas are allowed freedom. In no circumstances is virus allowed to be imported even by laboratory workers.

CANTON (p. 85) describes the organization of the public health service in Dakar as regards prevention of yellow fever and mentions the method of vaccination simultaneously against yellow fever and small-pox. SMITH *et al* (p. 70) report that in Colombia from 1937 to 1940 175 496 persons were vaccinated with virus 17D. Of 2,139 examined up to two years after vaccination, almost 90 per cent. were found to be immune.

Charles Wilcocks

YELLOW FEVER

ROCKEFELLER FOUNDATION. A REVIEW FOR 1940 [FOSDICK (Raymond B.) President] pp. 27-31 With 2 figs.—Unraveling the Yellow Fever Mystery

In this brief note a reference is made to the recent outbreak of yellow fever in the Nuba mountains of the Sudan which, it is stated, was probably transmitted by *Aedes aegypti* although there is a bare possibility that other vectors were involved [see below].

In recent work on jungle yellow fever in South America it has been shown that in wild animals inoculated with the virus no illness is as a rule produced, but the virus is present in the circulating blood while the animals are running about, a condition especially favourable to the spread of the virus. Several groups of animals are susceptible the chief of which are —

- Primates — man and monkeys.
- Marsupials — the opossums, all species
- Edentates — anteaters, sloths, armadillos
- Rodents — agouti, paca capybara, some species of mice.

Certain generalizations are made —

"1. Yellow fever is primarily a disease of jungle animals. The classical form involving transmission from man to man by the *Aed. aegypti* mosquito is more of a secondary cycle depending largely upon conditions of population concentration and mosquito breeding created by man himself.

2. Transmission of jungle yellow fever appears to be by jungle mosquitoes from animal to animal.

3. There is no animal reservoir of virus in the usual sense. Virus continues to circulate in the blood of susceptible animals for three or four days only and does not subsequently reappear. Mosquitoes however once infected tend to harbour the virus for the remainder of their lives which may be several months under favorable conditions.

In jungle yellow fever vaccination is the most important control measure but it is pointed out that the great value of control of *Aedes aegypti* in urban areas has been in no way diminished and that if this mosquito were controlled in towns the risk of transmission of the disease to East Africa India and the Orient in these days of fast travel could be avoided.

FINDLAY (G M) The First Recognized Epidemic of Yellow Fever—
Trans Roy Soc Trop Med & Hyg 1941 Nov 29 Vol. 35
No 3 pp 143-154 [27 refs] C IV

FINDLAY (G M) The Present Position of Yellow Fever in Africa.—
Trans Roy Soc Trop Med & Hyg 1941 Sept 9 Vol 35
No 2. pp 51-72. With 2 maps [18 refs.] Discussion pp
72-76 [SMITH (Hugh H) MACKIE (F P) GILL (G A) STANNUS
(H S) RICHARDSON (D T) MENZIES (T) HEWER (T F) &
FINDLAY (G M)]

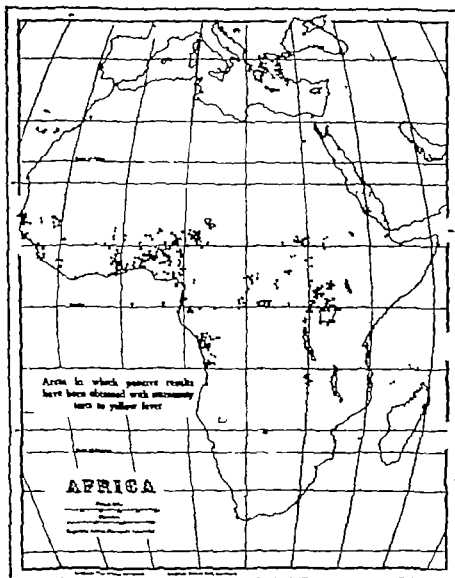
An interesting summary of the position of yellow fever in Africa including its present distribution epidemiology the possible spread of the disease and methods of control. Whilst the paper deals mainly with observations that have been published previously it should be read in its entirety for the results are discussed especially from the point of view of the difficulties which must be overcome if yellow fever is to be successfully controlled and its spread to India and the Far East prevented.

The present distribution of the disease is summarized in two maps showing in the first map the area in which positive results have been obtained with immunity tests to yellow fever and in the second one the area in which actual cases of the disease have been recorded between 1921 and 1941. It will be seen that the endemic area involves most of the central part of the continent, starting on the West Coast and extending across to at least the Sudan Abyssinian border. In order to determine changes in these endemic zones it is important to make repeated immunity surveys every 5 or 10 years. The value of these is shown in the case of Malakal where the first survey in 1933 gave only one positive out of 50 whilst a second survey in 1938 gave 21 positive out of 114. The most peculiar feature of the distribution of yellow fever is the occurrence of isolated cases without any apparent relationship to epidemics. In Freetown where no case had occurred since 1910 a single European official died of yellow fever in 1935 and no other cases could be found in the neighbourhood.

As in South America, it is possible to distinguish three epidemiological types of yellow fever showing respectively urban epidemicity rural epidemicity and rural endemicity.

Typical urban outbreaks occurred in Lagos in 1925-26 in Bathurst in 1934-35 in Accra in 1926-27 and again in 1937. In all these outbreaks *Aedes aegypti* would seem to be the sole vector.

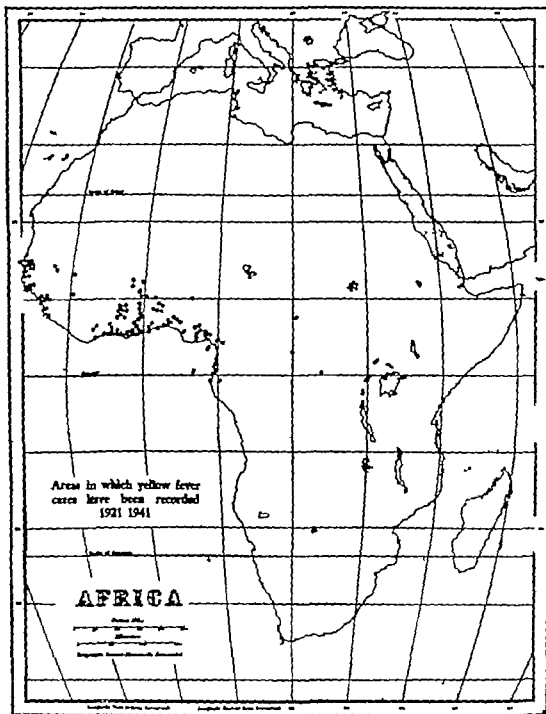
The most striking rural epidemic ever recorded in Africa is that which has recently occurred in the Anglo-Egyptian Sudan [see below p 69]



[Reproduced from the *Transactions of the Royal Society of Tropical Medicine and Hygiene*]

Smaller epidemics have been recorded from Ashanti in 1933 and in certain isolated villages of the Gold Coast in 1937. In none of these epidemics were infected *A. aegypti* caught in association with actual yellow fever cases, although this mosquito is widely distributed and breeds readily in the water in hollow trees, etc. Whilst at present it is impossible to exclude *A. aegypti* as a vector in these rural epidemics it is possible that other species of mosquitoes may play an accessory rôle.

Endemic yellow fever may be carried on entirely by the mosquito-man cycle, but hitherto efforts to isolate virus from patients with febrile symptoms in areas with a low rate of endemicity have not been successful.



[Reproduced from the *Transactions of the Royal Society of Tropical Medicine and Hygiene*]

It is possible that the virus may be carried on by a mosquito-animal cycle and there is considerable evidence to show that many wild and domestic animals may serve as hosts. Tables are given summarizing the results of applying the mouse protection test to the blood of African primates, domestic animals and birds many of which contain virucidal properties. It is also possible that the virus may persist for long periods in some other species of vertebrate or invertebrate and it is known that the disease can persist for some months in the absence of infected mosquitoes.

The spread of yellow fever at present, seems to depend on only two factors the infected mosquito and the infected human being but it is theoretically possible that the virus might be transferred by migratory animals. The mosquito does not normally fly for long distances but may be transported by air rail, road or ship. The infected human being develops fever after an incubation period of 2-6 days. During the latter part of this period, and during the first three days of fever virus may be present in the circulating blood therefore a yellow fever patient is infective to mosquitoes for four to seven days. It is obvious, therefore that with modern transport there is ample time for a patient to pass from an endemic to a non-endemic area during the period before or after he becomes infective.

The means of spread are discussed under the headings of aeroplanes railways boats and motor cars respectively and examples given showing that the danger of the spread of yellow fever to fresh countries is by no means a remote possibility. The increased rapidity of transport has already resulted in the recent spread of *Anopheles gambiae* from West Africa to Brazil, and many previous hindrances to travel such as internecine war have now disappeared.

The control of yellow fever depends at present on accurate and early diagnosis, destruction of mosquitoes, immunization and administrative measures. The only certain diagnosis should be based on examination of liver tissues in fatal cases by a competent pathologist mouse protection tests with the patients serum both during fever and later during convalescence and isolation of virus from the blood. The methods of mosquito destruction and immunization are next dealt with, and finally attention is drawn to certain other points which should be carried out by administrative authorities.

It is suggested that an infected area should be declared free from quarantine restrictions 30 days after the notification of the last case. Since *Aedes aegypti* bites readily during the late afternoon the placing of infected areas in quarantine from 6 p.m. to 6 a.m. would not prevent the spread of infection, and some of the sanitary regulations in force require fresh study and possible amendment. Finally the author stresses the necessity of co-ordination between the various countries interested in yellow fever since a lack of concerted measures against its spread may well be an important factor in aiding the spread of yellow fever throughout Africa.

In the discussion Dr. Hugh H. Smith mentioned the fact that in Colombia between November 1940 and February 1941 yellow fever virus had been isolated eight times from wild bush mosquitoes (*Haemagogus* sp.) in the Villavieja area. It is very difficult to explain the mechanism of continuing yellow fever infection in this region and hitherto there is no agreement among the various workers in South America as to whether yellow fever infection remains in particular endemic areas for long periods of time or whether the infection travels through the bush and returns to a given area periodically.

E. Hindle

FIXIDAY (G. M.) Yellow Fever and the Anglo-Egyptian Sudan. Historical.—*Ann Trop Med & Parasit.* 1941 Oct. 21 Vol. 35. No 1 pp 50-65. [16 refs.]

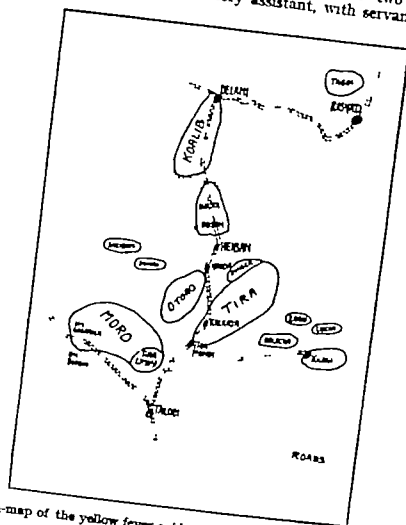
Although there is no definite account of an epidemic of yellow fever in the Anglo-Egyptian Sudan in historic times, natives of Eordofan

were immune to yellow fever when taken to Mexico in 1863. There is also evidence that they were far more resistant than Egyptians to fevers present in the Upper Nile Province of the Anglo-Egyptian Sudan. There is no evidence to suggest that yellow fever has been recently introduced into the Sudan.

KIRK (R) An Epidemic of Yellow Fever in the Nuba Mountains Anglo-Egyptian Sudan—*Ann Trop Med & Parasit* 1941 Oct 21 Vol. 35 No 1 pp 67-112. With 2 maps 9 charts & 4 figs. on 2 plates [30 refs.]

A detailed account of a most important outbreak of yellow fever in the Nuba Mountains, the most striking rural epidemic of the disease ever recorded from Africa.

The possible existence of yellow fever in this district had previously been brought to notice by the discovery that a considerable percentage of the natives gave positive mouse protection tests but no evidence of a disease clinically resembling yellow fever could be obtained. In 1940 during the latter part of the rainy season an obscure epidemic appeared in the Tira and Otoro hills. The author, two British colleagues and a Sudanese laboratory assistant, with servants went to



Sketch-map of the yellow fever epidemic area in the Nuba Mountains, showing the affected hill-groups.

[Reproduced from the *Annals of Tropical Medicine and Parasitology*]

this district and being non-immunes most of the original party went down with the disease which was proved beyond any doubt to be yellow fever.

A description of the country, climate and population is followed by a brief account of the wild mammals. The fauna includes monkeys and Pruner's hedgehog, both susceptible to yellow fever. Local enques, however, failed to produce any indication of an epizootic among the hedgehogs.

The course of the epidemic is rather difficult to trace but it probably originated in Tira Limon, where cases occurred in May 1940. This is one of the highest and most inaccessible hills of the Moro group and is inhabited by the wildest of all the Nuba tribes. The way in which it spread in the Moro block, until after mid July it extended to other parts of the Nuba Mountains, is discussed. The epidemic died out towards the end of November, the last cases occurring in Tira Otoro and Alleira. It is curious that the disease inspired great dread among the people although there was only a short illness with comparatively low mortality.

A clinical diagnosis of yellow fever seemed to be justified by the main features of the epidemic, a short influenza-like fever associated with cases of jaundice and deaths preceded by black vomit, occurring in an area with positive mouse protection tests. The diagnosis was confirmed by examination of the livers of fatal cases by the demonstration that yellow fever immune bodies developed in the blood during the course of the disease by the isolation of typical yellow fever virus from the blood of patients during the early febrile stages, and finally by the results of epidemiological studies, which showed that the epidemic was followed by a rise in the proportion of immunes in the population.

The cause of the epidemic cannot be defined with any certainty but owing to the war conditions in the Sudan generally were unusually favourable to the spread of the disease, since large numbers of non-immunes were introduced. There is no evidence however that the war was responsible for initiation of the outbreak, for the Nuba Mountains lie off the main routes of communication. There is evidence in support of the view that the virus has been present there for a very long time and certainly in the recent past but the reason for the sudden development of an epidemic of this magnitude is very difficult to explain. The results of immunity surveys, made in 28 places in the area before the epidemic, show that 22 contained positive sera in percentages ranging from 7 to 80 per cent with 3 as the age of the youngest positive donor.

The incidence and mortality are summarized in the table below.

The disease attacked both sexes and all ages with no discrimination in respect of race, physical condition or social status, but very young children seemed to escape.

The mortality rate was approximately 10 per cent, but the true rate is probably much lower since there is good evidence that many mild cases were not recognized.

The general course of the disease is described from records of over 300 cases observed personally by the author. The onset was generally sudden, with fever, severe headache, pains in the neck, loins and legs, often with vomiting. There was congestion of the eyes, without coryza. Albuminuria was present, increasing in amount as the disease progressed. The tongue was small and pointed, furred in the centre, but

Yellow Fever incidence of cases and deaths in the Nuba Mountains 1940

Locality	Population.	Cases.	Deaths
Tira Lamon	6 000	—	—
Moro	20 000	4 970	548
Otoro	17 000	4 718	476
Tira	9 000	3 726	328
Shwai	3 000	302	30
Heiban	11 000	364	89
Kaalib	22,000	64	4
Kilogi	7 000	783	65
Sheiban	2,000	330	35
Talodi	12,500	5	2
Total	—	15 267	1 577

clean at the edges and tip. The influenza like fever might last any thing from a few hours to three or four days after which complete recovery might occur or else more severe symptoms appeared, such as slowing of the pulse jaundice haemorrhages from gums nose or stomach black vomit melaena and reduction or suppression of urine. The illness was always short the patient being either dead or out of danger inside a week. When death occurred it was usually between the fourth and sixth day.

Convalescence was not usually rapid the decline in fever being followed by a variable period of very marked asthenia in all except the very mildest cases. The only serious complication observed was myocarditis which caused a number of late deaths.

The development of *immunity* was tested by making mouse protection tests with blood samples of the patients collected at the beginning of the fever and a few days later. The results indicate that demonstrable immunity appears suddenly about the fifth day of the disease.

A *post-epidemic survey* was carried out in January 1941 shortly after the epidemic had subsided and in one district the percentage of immunes had risen from 1 in 15 to 13 in 15 tested. The results for three districts are summarized in the following table —

Comparison of the number of recorded cases in Heiban Otoro and Tira with the number estimated from immunity surveys

	Heiban.	Otoro.	Tira.	Total.
Population	11 000	17 000	9 000	—
No. of cases recorded	364	4 718	3 726	8 808
Percentage	33	28	41	—
Percentage of immunes in pre-epidemic surveys	10[4 in 41]	—[0 in 8]	7[1 in 15]	—
Percentage of immunes in post-epidemic surveys	63[26 in 41]	63[5 in 8]	87[13 in 15]	—
Percentage of population immunized during epidemic	53	63	80	—
Estimated no. of persons immunized during epidemic	5 830	10 710	7 200	23,740

[The numbers of sera examined were small—it is perhaps unwise to base estimations of large numbers on these percentages, though no doubt the author's main conclusions are justified.]

The chief interest of this epidemic lies in the number of mild cases which were recorded and the author gives examples showing some of the difficulties encountered in their diagnosis. Many of the early cases were overlooked at the beginning and if more severe cases had not occurred, the epidemic might have been regarded as influenza, sandfly fever or one of the other three-day fevers encountered in the tropics.

Liver specimens were obtained by viscerotomy from seven fatal cases and all showed typical pathological changes.

With regard to the vector it is unfortunate that only incomplete entomological data are available, but it can be stated definitely that *Aedes aegypti* was present throughout the epidemic area. Although essentially a domestic species it has been found breeding in the Nuba mountains 2-3 miles from the nearest house. In addition to *Aedes aegypti* other species able to transmit yellow fever in the laboratory were found in the affected area, especially *Aedes cullatus* which is very abundant during the rains, breeding in rock pools near the hills.

E H

LEAGUE OF NATIONS HEALTH ORGANISATION EASTERN BUREAU
SINGAPORE ANNUAL REPORT FOR 1940 pp. 71-76. With 1 map—Yellow Fever

Yellow fever broke out in the Nuba mountains of the Sudan soon after the July-August rains of 1940. The infected country is entirely mountainous and *Aedes* mosquitoes are prevalent in small numbers during the rainy season breeding in tree holes and domestic water collections. There has been a widespread infection with the virus for the past 20 years but clinical cases were not found until this outbreak occurred. The outbreak is stated not to have been introduced from West Africa, as the affected area is far removed from all lines of communication. It appears, therefore, that the disease has been lying dormant in this area for several years and has now flared up in virulent form.

The steps taken by the Sudan Government included the following —

- " (a) Declaration of the area as infected with yellow fever from 7th November
- (b) Strict isolation of the area and restriction of movements of persons
- " (c) Egress was only permitted when essential, and then after a quarantine period of ten days at the control posts
- (d) The whole area was closed to air traffic and the aerodromes of El Obeid and Juba were declared anti-amaryl
- " (e) Intensification of anti-aedes measures and
- (f) Further investigation by specialists "

Reference is made to the work of WHITFIELD who has found the following species, known to be capable of carrying yellow fever in the laboratory or in nature among the insects collected in aircraft at the aerodromes of the Sudan — *Aedes aegypti*, *A. laterocephalus*, *A. simpsoni* and *Mansonia africana*. But the comparative absence of *Aedes aegypti* in the Nuba mountains has led to the suspicion that this outbreak may be due to the jungle type of the disease. Investigations on this point are in progress.

C II

FAST GALVIS (Augusto) Resultados del examen de las primeras 5 000 muestras de hgado humano obtenidas en Colombia para el estudio de la fiebre amarilla. [Results of the Examination of the First 5,000 Liver Specimens Obtained in Colombia for the Study of Yellow Fever]—Reprinted from *Rev de Hig* Bogota 1941 Apr No 4 29 pp With 4 graphs [15 refs]

In 1930 the Yellow Fever Service of Brazil searching for a method to discover outbreaks of the disease in isolated communities where its presence was otherwise not suspected developed an instrument known as the viscerotome. An extensive service was set up which made possible the routine collection of liver specimens from rapidly fatal febrile cases by non medical personnel over wide areas with a minimum of expense and trouble [see this *Bulletin* 1934 Vol. 31 p 836 and 1937 Vol 34 p 686]. In 1934 shortly after jungle yellow fever had been shown to exist in the interior of Colombia it was decided to introduce viscerotomy into that country as a routine procedure of the yellow fever service then being organized by the National Department of Health in co-operation with the Rockefeller Foundation. This report sets forth the results obtained in the examination of the 5 000 specimens of human liver collected by the viscerotomy service in Colombia between September 1934 and February 1940. During this period 117 viscerotomy posts were established throughout the country in carefully selected localities where climatic conditions made it seem likely that yellow fever might appear. The representative in charge of each post was directed to obtain a piece of liver from each individual in his area who died from any acute febrile illness of not more than ten days duration. These specimens preserved in formalin are sent by post to the central laboratory for examination. Thus over this period of years there has been established a routine service which functions most satisfactorily for the rapid detection of yellow fever outbreaks in widely separated and isolated places.

Among the 5 000 liver specimens examined were 196 diagnosed as being positive for yellow fever. In many of these cases the diagnosis was confirmed by subsequent field investigations. By means of this service it has been possible not only to prove the presence of yellow fever in several regions of Colombia in which it was not previously suspected but also to demonstrate that it does not exist in many other parts of the country where the conditions are apparently favourable for its propagation.

Although the chief function of the viscerotomy service is to find yellow fever it is also of value in the discovery of various other diseases which produce characteristic liver lesions [see this *Bulletin* 1935 Vol. 32 pp 126-127 and 481]. Epidemics of fatal malaria and areas of high malarial endemicity are quickly brought to light. An interesting series of cases showing acute massive liver necrosis is reported from two widely separated districts of Colombia. Such cases are known to have been occurring in these same regions for many years and were formerly confused with yellow fever. The aetiology is still unknown.

Hugh H Smith

VAN SOMEREN (E C C.) Yellow Fever Control Key and Chart to the Known Aedes Adults of Kenya.—3 pp With 14 figs.

Appended to this key is a series of figures showing very clearly the thoracic markings of 14 species

C W

[February 1942]

ROZEBOOV (L. E.) The Overwintering of *Aedes aegypti* L. in Stillwater Oklahoma.—*Proc Okla Acad Sci* Norman Okla. 1939 Vol 19 pp 81-82. [Summarized in *Rev Applied Entom Ser B* 1941 Aug Vol 29 Pt. 8 p. 128.]

It is shown from a brief review of the literature that the range of *Aedes aegypti* L. may be divided into a permanent region, where the temperatures are high enough for it to breed continuously a border line zone where it hibernates in the egg stage and a temporary summer region into which it may spread during warm weather but in which it does not survive the winter. The extent of this summer region is evidenced by the epidemics of yellow fever that occurred as far north as Philadelphia, New York and Boston before the method of controlling the disease was known.

A. aegypti seems to be fairly common in Oklahoma and becomes an annoying household pest in Stillwater during the latter part of the summer. As Stillwater is not far from its northern limit of permanent distribution a laboratory colony was established from adults collected locally in 1937 and three batches of eggs from it were exposed to winter conditions to find if they would survive. They were kept throughout the winter on sand in wide-necked bottles two in one bottle were in a shed where they had some protection from snow and rain but none from cold. The other bottle was placed on the ground outside. The eggs were brought into the laboratory and immersed in water in April. Only one larva hatched from the batch of eggs that had been kept outdoors and it died in the pupal stage but large numbers hatched from the other two batches and developed into vigorous adults. During the winter there were several periods when the temperature dropped considerably below freezing point for 4-8 days in succession on the coldest day the maximum was 32°F and the minimum 8°. The distribution of the mosquito at Stillwater in the summer of 1939 suggested that many eggs had survived the winter in nature. An unusually severe winter might possibly destroy all eggs exposed to it but since the mosquito breeds in and around houses and barns, the protection thus afforded would probably be sufficient to ensure its permanent existence."

VILLIERS (Endoro) Histology of Human Yellow Fever when Death is Delayed.—*Arch Pathology* 1941 June Vol 31 No 6 pp. 685-688 With 1 coloured plate

Death from yellow fever usually occurs within 10 days of the onset. A number of workers have established criteria for the histological diagnosis of such cases. The chief changes in human livers are—a salt and pepper distribution throughout the entire lobule with greatest prevalence in the mid-zone of rounded refractile acidophilic bodies, the so-called Councilman bodies. These acidophilic bodies sometimes show the shadows of nuclei within them. They are the remains of parenchymatous cells that have undergone a specific type of necrosis. An absence of complete necrosis of the central zone of the liver immediately adjacent to the central veins even though at first sight all the cells seem to have undergone the acidophilic change.

A jumbling of the trabeculae more accentuated in the mid-zone of the lobule than elsewhere

Fatty degeneration of varying intensity generally more abundant in the centre and periphery than in the mid-zone of the lobule

Findings of cell
nuclei changes
later have not
of normal col
10 per cent.
nuclei are
practically
nuclei cells
showed the
principally
below per
hypertrophy

In the
of fibres
the dis
which
the so
nuclei
liver
after
The
ac
ter
to
th
p
e

Findings of secondary value in the diagnosis of acute cases include nuclear changes such as oedema and intranuclear inclusions the latter have not proved of practical value in the routine examination of material collected by viscerotomy in South America and fixed in 10 per cent formaldehyde in physiological saline [Intranuclear inclusions are not well preserved by this fixative Zenker's fluid is preferable In most human livers only 20 to 30 per cent of parenchymatous cells exhibit intranuclear inclusions but in some African outbreaks, e.g. Accra in 1937 nearly 70 per cent of the liver cells showed them.] Other changes are varying leucocytic infiltration principally of mononuclear cells most pronounced in the mid zone yellow pigment inside the parenchymatous cells of the central zone hyperaemia of the sinusoids especially in the mid zonal region

In the case of a patient who had died on the 17th day after the onset of illness a clinical diagnosis of yellow fever had been made because of the classical symptoms and of other cases on the same *fazenda* in which the typical liver changes were noted. In the liver of this case the most prominent finding was of bright ochre-coloured granules scattered among a few Councilman bodies. An examination of other livers more especially from cases where death had occurred on or after the eighth day showed a varying number of these ochre bodies. These ochre bodies vary in size but are generally smaller than Councilman bodies. They may be free among the non-necrotic parenchymatous cells or more often within macrophages and Kupffer cells. In unstained frozen sections they are dirty yellow or ochre-coloured they remain unchanged after treatment with acid alcohol or hydrogen peroxide are coloured orange ochre with Sudan III are black in material stained by the del Rio Hortega method (unpregnation with silver carbonate counterstaining with gold chloride) the Councilman bodies being dark violet and are negative to the Prussian blue test for iron

In some livers where Councilman lesions are absent or so few in number as to make a diagnosis of yellow fever difficult the ochre-coloured granular bodies show a distribution exactly similar to that of Councilman bodies in classic yellow fever. By examining a number of preparations it has been possible to follow the transition in colour from the eosinophilic pink of the early Councilman lesions through brownish yellow to the bright ochre of the granular bodies which must be regarded as the last stage of the Councilman lesion probably after impregnation with bile pigments

The presence of the ochre bodies can be used as a basis for the diagnosis of yellow fever provided the following suggestive changes are also found—fatty degeneration usually slight in degree and most frequently in the central zone slight jumbling of the trabeculae in the mid zone increase in size of the nuclei of the parenchymatous cells hyperplasia of the Kupffer cells and the presence of leucocytes most frequently in the mid zone

As a result of the finding of these ochre bodies in the liver every specimen of liver which had a histological diagnosis at variance with the clinical diagnosis was re-examined, and on the basis of the presence of the ochre bodies a diagnosis of yellow fever was established in 23 in which death had occurred 8 to 17 days after the onset of illness. From one of these cases yellow fever virus had been isolated from the blood on the second day of illness.

G M Findlay

DUFF (D) Diagnosis of Yellow Fever [Correspondence.]—Brit. Med. J. 1941 Sept. 8. p. 357

The writer of this letter remarks that in the early days of outbreaks of yellow fever in the Gold Coast the cases are often missed, and points out that experienced medical officers place considerable reliance upon frequent examination of urine to detect the marked increase in albumin which occurs from the second or third day onwards. A diagnosis is usually made in the presence of the following group of symptoms: Sudden pyrexia, early prostration, severe frontal headache with congestion of the eyes, backache and increasing albuminuria. Jaundice and haemorrhages are later symptoms and in mild cases jaundice may hardly be noticeable.

There is no quick test for the disease in the early stages but the occurrence of cases with the foregoing syndrome in an endemic area justifies prompt application of local preventive measures.

In treatment it is vitally necessary to withhold all food in the early days of the illness—ingestion may be followed rapidly by a profuse haematemesis and death. C IV

UGANDA PROTECTORATE ANNUAL REPORT OF THE MEDICAL DEPARTMENT FOR THE YEAR ENDED 31ST DECEMBER, 1940 (SHELTON (C. F.) Ag. Director) Appendix I pp 14-15—Summary of the Main Conclusions and Recommendations of the Conference held at Nairobi in December 1940, for the Control of Yellow Fever in East Africa (vide page 4)

Control measures come under three headings—mosquito control, quarantine and inoculation. It is of paramount importance that *Aedes aegypti* should be eliminated from seaports, ships and dhows on the sea or the great lakes inland urban centres and aerodromes, railway premises, and all premises near stations and stopping places. The usual certificates are recommended that declaring vaccination stipulates that it should have been done not less than 14 days and not more than two years before the traveller was last exposed to yellow fever infection.

It is desirable that all those who may be likely to travel by air in Africa, and that all troops in certain areas, should be vaccinated minus vaccination of the entire indigenous population inhabiting a ten-mile strip along the coast of Kenya is desirable and justifiable if it can be carried out. Viscerotomy services should be instituted and more mouse protection tests carried out. C IV

LE VAX (James H.) Methods for controlling *Aedes aegypti* Mosquitoes with *Gambusia holbrooki* Minnows at Key West, Florida.—Public Health Rep. 1941 June 6 Vol 58 No 23. pp. 1217-1221. With 4 figs. on 2 plates

At Key West, Florida, there is perennial infestation with *Aedes aegypti* which breeds principally in cisterns and wells at the time of this study the city had no public water supply and cisterns and other containers were in general use for collection and storage of rain-water. *Gambusia holbrooki* is found in fresh water ponds on Stock Island near Key West. The author stocked 2,754 cisterns, wells and receptacles with the minnows after placing them overnight in water chlorinated to 0.1 to 0.15 parts per million of residual chlorine to

prevent the introduction of bacterial contamination with the fish. It was found that *Gambusia* could not clean up water heavily infected with larvae, and in such cases the water was first covered with kerosene and the fish introduced when the larvae were killed. The film of kerosene did not seem to harm *Gambusia*.

After eight months 2 376 containers and wells were inspected. 1 105 contained fish and in only eight of these were larvae found whereas in 1,271 from which the fish had disappeared larvae were present in 632. Many of the cisterns had in the meantime been pumped dry and refilled without restocking and the fish had disappeared from many wells probably having been removed by children. Educational measures have been undertaken and have met with some success since requests for restocking with *Gambusia* have now been received. Detailed figures of the investigations are given. C IV

LE VAN (James H.) Present-Day Methods for controlling *Aedes aegypti* Mosquitoes.—*Public Health Rep* 1941 Sept 19 Vol. 56 No 38 pp 1875-1890 With 4 figs on 1 plate

The information contained in this paper is much the same as that abstracted in this *Bulletin* 1941 Vol. 38 p 70 C IV

SMITH (Hugh H.) CALDERÓN-CUERVO (Hector) & LEYVA (José Pablo) A Comparison of High and Low Subcultures of Yellow Fever Vaccine (17D) in Human Groups.—*Amer J Trop Med* 1941 July Vol. 21 No 4 pp 579-587

A comparison of the results of vaccination in human groups with three lots of yellow fever vaccine each prepared from the 17D strain of virus evolved from the Asibi strain [see this *Bulletin* 1936 Vol. 33 p 623]. One lot of vaccine was prepared from virus that had been maintained in tissue culture media for 342 passages; the second and third lots were prepared from seed virus of the 212th and 450th subcultures respectively. Each of the vaccines was prepared by inoculating the culture virus into 7-day-old developing fowl embryos and incubating for four days, then pooling the embryos and triturating in a ball-mill. A 10 per cent. suspension of this ground-up tissue is made in normal human serum; the mixture centrifuged for 30 minutes at 3 000 r.p.m. after which the supernatant fluid is filtered through a Sertz E K. filter disc at 10 lb pressure. The vaccine is distributed into ampoules; then frozen and dried in vacuo after which it is submitted to the usual tests in both mice and rhesus monkeys.

The human groups used for this study comprised adult males between 20 and 50 years of age who had been born and had lived continuously on the high savannah around Bogotá. Before vaccination the sera of all the men were tested for yellow fever antibodies. The men were then vaccinated with varying doses of active virus and their sera tested for the development of antibodies by protection tests in mice. No significant difference was found in the immunising efficiency of the three lots of vaccine. With dosages approaching 100 m.i.d. for mice some individuals failed to produce demonstrable antibodies whilst other persons showed definite immunity after as little as 10 m.i.d. for mice with both high and low sub-culture virus.

E H

SELLARDS (Andrew Watson) Immunization against Yellow Fever with a Consideration of the Effects of a Virulent Neurotropic Strain on the Central Nervous System of Monkeys.—*Amer J Trop Med* 1941 May Vol 21 No 3 pp. 383-397 [25 refs]

A general discussion of vaccination against yellow fever in which the author emphasizes the opinion that effective immunization requires the injection of living modified virus and the development of an infection.

In view of the severe reactions which sometimes follow the use of living neurotropic virus from mice the author made some experiments, using very dilute suspensions of the French neurotropic strain injected intracerebrally into monkeys. The results are given in the accompanying table from which it is seen that when the dilution reached 1:5,000,000 or 1:10,000,000 the inoculation of 0.1 cc. or less into the caudal magna of monkeys produced no clinical symptoms but four out of five were immunized.—

TABLE I
The effect of neurotropic yellow fever virus on the central nervous system of monkeys

The effect of microtropic virus of monkeys						
Injection of Rhesus Monkeys.						
Number of Monkey	Dilution of infective mouse brain 1 to	% of dilution	Route of Injection	Onset of fever	Result	Protective effect on serum for mice
Experiment 1						
1	100 000	0.05	Cisterna magna	day 6	Died†	Complete
2	1 000 000	0.05	Cisterna magna	8	Died†	
3	1 000 000	0.1	Cisterna magna	8	Died†	
4	10,000,000	0.1	Cisterna magna	11	Well	
Experiment 2						
5	5 000 000	0.1	Cisterna magna	6	Well	Complete
6	10 000 000	0.05*	Cisterna magna	None	Well	Complete
7	10 000 000	0.05	Cisterna magna	8	Well	Complete
8	10,000 000	0.1	Cisterna magna	12	Well	Complete
9	10,000 000	0.05	Cerebrum	None	Well	Complete
10	10,000,000	0.1	Cerebrum	None	Well	Complete
Experiment 3						
11	1 000 000	0.1	Cerebrum	5	Died†	None
12	5 000 000	0.1	Cerebrum	8	Died, Well	
13	10 000 000	0.03*	Cerebrum	None	Died, Well	Complete
14	10 000 000	0.05	Cerebrum	5	Died, Well	
15	10,000 000	0.1	Cerebrum	None (2)	Died, Well	Complete
16	100 000	0.1	Subcutaneous†	9	Well	
17	100 000	0.1	Subcutaneous†	None	Well	
† Estimated. † With gross trauma of frontal lobe. † Encephalitis.						

Estimated.

† With gross trauma of frontal lobe.

‡ Encephalitis.

The inoculation of similar doses intracerebrally was usually followed by death from encephalitis. Out of two monkeys with gross trauma of the frontal lobe inoculated subcutaneously with larger doses one died of yellow fever and the other remained well and developed immunity. It is stated that accidents of vaccination have occurred in any form of technique in which living virus is employed and up to the present patients have shown symptoms of meningitis encephalitis or myelitis followed by complete recovery without sequelae.

The author states that sero-vaccination has limited possibilities for on some occasions many of the patients failed to develop a protective serum and a few of these persons subsequently developed yellow fever some of the infections being fatal.

He considers that there is opportunity for improvement in any of the techniques in use at present and that they do not represent in detail the methods which will eventually be developed for vaccination against yellow fever.

E H

FINDLAY (G. M.) Our Present Knowledge of Yellow Fever.—*South African Med J* 1941 Apr 26 Vol 15 No. 8 pp 143-144

PORTUONDO BARCELO (J. M.) Fiebre amarilla. Tifus icteroides. Vómito negro. Algunas consideraciones sobre la etiología epidemiología y sintomatología de esta enfermedad. Importancia del problema amarillo en el status sanitario de Cuba. [Yellow Fever. General Considerations and Importance in Cuba.]—*Rev Méd-Quirúrg de Oriente* Santiago de Cuba. 1941 Sept. Vol 2. No 3 pp 172-181

BABLET (J.) Sur l'organisation antiamarile au Brésil. [Organization of the Yellow Fever Service in Brazil.]—*Bull Soc. Path Exot* 1940 Vol 34 Nos 1-3 pp 5-15.

RABIES

A REVIEW OF RECENT ARTICLES XXXVI *

1. Virus

The work of BERNKOFF and KLIGLER¹ on the cultivation of rabies virus in developing chick embryos has been summarized in this *Bulletin* on various occasions (1938 Vol 35 p 641 1939 Vol 36 pp 163 and 724 1941 Vol 38 p 494). The characteristics of the virus which is now in its 47th passage are further discussed. It shows no enhancement of virulence for the chick embryo as judged by the fact that the embryos develop normally by the relatively low titre in the embryo brain (1 in 1 000 to 1 in 10 000) and by the scanty pathological changes in the brain. Virulence for mice and guinea-pigs remains unchanged whilst that for rabbit is considerably reduced as demonstrated by the prolonged incubation period (11 to 13 days) and by the duration of infection. The specific antigenic character of the chick embryo virus remained unchanged during 47 passages over a period of 18 months.

*For the thirty-fifth of this series see this *Bulletin* Vol. 38 p 494

BERNKOFF (H.) & KLIGLER (I. J.) Characteristics of a Fixed Rabies Virus Cultivated on Developing Chick Embryos.—*Proc Soc Experim Biol & Med* 1940 Oct. Vol 45 No. 1 pp 332-335

DAWSON² has carried to a further stage his investigations on the propagation of rabies virus by inoculation directly into the chick embryo brain. It will be remembered that in his earlier experiments he found that subpassage by this method was simple and constant, and that the brains of chicks killed on the six or seventh day contained "an enormous number of Negri bodies" [this *Bulletin* 1940 Vol. 37 p. 191]. He is now confirmed in his belief that "the chick embryo brain is an ideal medium for the propagation of rabies virus. He gives the histories of three strains which now have been carried through 65, 25 and 3 subpassages respectively. No gross pathological changes were observed until the third or fourth embryo-generation, when a mild hydrocephalus was noticed. In later generations this was more severe being detectable as early as the third or fourth day and thereafter increasing rapidly. The entire ventricular system was dilated, and the subarachnoid spaces enlarged, especially in the neighbourhood of the cerebellum. Symmetrical haemorrhagic necrosis of the tectum and forebrain supervened in later generations. Microscopic examination revealed severe hydromyelia, encephalomalacia and myelomalacia. Negri bodies were abundant in the neurones and were diverse in size. Larger bodies were vacuolated and contained basophilic inner bodies. They were found in the retina, in peripheral ganglia, in the central nervous system, in ependymal epithelium and phagocytosed, in large mononuclear leucocytes. Inoculation by other routes caused similar appearances.

The effects are thus profound and, as the lesions are observed as early as the third day and death is usually as late as the eleventh day it appears that the chick is able to withstand a massive inoculation over a long period. This remarkable ability of the embryo to withstand infection much longer than other hosts makes it possible to study the more mature lesions of rabies.

It was also found that chick embryo-brain passage was associated with a marked reduction in pathogenicity for rabbit and mouse so great that it was possible to produce a "self limited non-fatal disease in rabbits by intracerebral inoculation, and in mice by subcutaneous or intramuscular injection of embryo passage virus." Tests showed that recovery from the mild disease is followed by a solid immunity to intracerebral inoculation of rabbit fixed virus and mouse-passage virus. At present the embryo passage virus is still highly virulent for dogs but "it is hoped that prolonged passage will bring about alterations in virulence for dogs, comparable to those which have occurred for rabbits. From a practical point of view such a strain of virus would be an ideal vaccine since it would be possible to immunize the animal with a single dose of virus which actually produced a mild infection. It would of course be essential that the mild disease produced in this fashion be non-transmissible in nature." The pathological changes described are well illustrated.

Although, on account of its high sensitivity the rabbit is the animal of election for the study of the Aujeszky virus, the use of the guinea pig presents certain advantages. It will be remembered (this *Bulletin* 1933, Vol. 30 p. 578) that SHORE found that after subpassage the virus was 10 times more prevalent in the brain of the rabbit than in that of the guinea pig and that the guinea pig is about 100 times

DAWSON (JAMES E.). J. A Study of Chick Embryo-Adapted Rabies Virus.—*Amer. J. Path.* 1941. Mar. Vol. 37 No. 2 pp. 177-183. With 1 text fig. & 15 figs. on 4 plates.

more resistant to subcutaneous dosage than the rabbit. He also noted that subpassage through the guineapig caused an actual attenuation of the virus. CARNEIRO³ finds that intramuscular injection into the guineapig is much more effective than subcutaneous injection and that the results obtained have the advantage of greater constancy. The period of incubation is regular and short—between two and three days—local pruritus is a constant symptom the minimum lethal dose is approximately 1 cc. of a 1 in 2 500 emulsion. For these reasons he recommends the use of the guineapig in the routine diagnosis of the disease.

ii Pathology

A series of experiments has been carried out by HABEL⁴ with the object of determining the tissue site of anti rabies immunity by observing any difference in the progression of peripherally introduced virus in normal and in immunized mice and guineapigs as well as by the titration of virus-neutralizing properties of immunized rabbits. Both live virus vaccine protecting against 10 M.L.D. of fixed virus introduced intracerebrally and phenol vaccine protecting against 1 M.L.D. were employed. The test dose was 0.2 cc. of a 1 in 5 dilution of first passage guineapig street virus brain injected into the right gastrocnemius. After 24 and 48 hours and 10 days portions of right gastrocnemius, right sciatic, lumbar cord, brain and spleen were emulsified and inoculated into three young Swiss mice. Taking two deaths after the tenth day out of three mice injected with each tissue or at least one death in which Negri bodies were found as the criterion for the presence of virus it was found that by 24 hours street virus was not demonstrable in the muscles of the controls but was present in the sciatic nerve and had also reached the lumbar cord. In the mice immunized with the phenol vaccine S.V. was demonstrated only in spleen at the end of 24 hours in all tissues except spleen in 48 hours and in the sciatic nerve spinal cord and brain in 10 days. In the mice immunized with live virus vaccine S.V. was present in none of the tissues after 24 hours in 48 hours only in the muscle and in 10 days in none. In these mice experiments the phenol vaccine was a poor immunizing agent and either the test mice were relatively insusceptible or the S.V. was not highly virulent.

A similar series was carried out on guineapigs and in this case the phenol vaccine was of high immunizing potency and the S.V. was virulent. Further experiments were carried out to determine whether emulsions from the above tissues were able to neutralize fixed virus *in vitro*.

The general conclusions from these experiments on mice and guineapigs were that in the controls the S.V. remained viable and perhaps multiplied in the muscle at the site of inoculation for at least four days in spite of the fact that in the tissue neutralization test the muscle of the control rabbit was able to neutralize 100 M.L.D. of virus. Spread of virus in untreated animals to the peripheral nerve

³ CARNEIRO (V). A cobaias no estudo experimental da doença de Anjeazky.—*Archivos do Inst. Biol. Buenos Aires*. 1940. Vol. 11 pp. 97-106. [12 refs.] English summary

⁴ HABEL (Karl). Tissue Factors in Antirabies Immunity of Experimental Animals.—*Public Health Rep* 1941 Apr 4 Vol. 56. No. 14 pp. 692-702. [30 refs.]

thence to the spinal cord, apparently occurred within 24 to 48 hours, whereas progression in the central nervous system to the brain was more delayed.

Animals vaccinated with live virus vaccine showed virus only at the site of inoculation for as long as four days and never in the peripheral or central nervous system.

In mice receiving a vaccine of low potency the spread of peripherally introduced S.V. appeared to be increased.

Domene⁶ and his co-workers report observations on the effect of anti-rabic immunization by dried and glycerinated cords on certain blood characters. As is well known, these present no striking features.

In the human subject they observed inconstant change of polynuclear and eosinophil leucocytes, but no significant change in the Arneith index, no change in chlorides, and nothing significant regarding blood sugar and polypeptides. In 10 per cent of cases there was a slight albuminuria. Globular resistance was diminished in 49 per cent of cases and increased in 7 per cent.

In the experimentally treated rabbit they noted increase in blood chlorides both in plasma and cells, but no variation in the erythroplasmatic ratio, an inconstant glycaemia not accompanied by glycosuria, no alteration in polypeptides and albuminuria in 90 per cent of cases during the period of paralysis which increased till death.

iii. Methods of Treatment and Statistics

WEBSTER and CASALS⁷ recapitulate in fuller detail the results of investigations carried out by the American school on irradiated tissue culture virus. These have been summarized in previous reviews [this Bulletin 1941 Vol. 39 pp. 181 and 498]. They conclude that "from a practical point of view culture virus has not yet proved a satisfactory source of rabies vaccine, due chiefly to its low content of virus. Altogether the results of the experiments to date suggest that basically the immunizing potency of a vaccine is dependent upon virus content, that is that the immunizing antigen is the virus particle. The findings point to a relation between number of mouse lethal doses required to immunize and body weight."

In a previous paper [this Bulletin 1939 Vol. 36 p. 728] KLIGLER and BERNKOPF⁸ noted that mice receiving one dose (0.5 cc) of formalized tissue culture virus by the intraperitoneal route were immune to a subsequent infecting dose of mouse brain virus given intraperitoneally. A modification of this procedure has now been tested on

- ⁶ Domene (J.) & HOAG-0-TREN-TAY. Formule leucocytaire et image d'Arneith dans le traitement antirabique postérieur.—*Rev. Méd. Française d'Extrême-Orient* 1940 [June-July No. 8 pp. 235-238 With 1 chart.
- AUTREUIL (Ch.) & DOMENE (J.) Quelques modifications humorales chez les Annamites traités par la méthode Pasteurienne.—*Rev. Méd. Française d'Extrême-Orient* 1940 [June-July No. 8 pp. 330-342.
- DOMENE (J.) La résistance globulaire chez le Tonkinois normal et chez le Tonkinois soumis au traitement antirabique postérieur.—*Rev. Méd. Française d'Extrême-Orient* 1940 [Nov-Dec No. 10 pp. 574-578 With 4 charts.
- AUTREUIL (Ch.) & DOMENE (J.) Quelques modifications humorales au cours de la rage expérimentale à virus fixe du lapin.—*Rev. Méd. Française d'Extrême-Orient* 1940 [June-July No. 8 pp. 243-248.
- ⁷ WEBSTER (L. T.) & CASALS (J.) The Quantity of Irradiated Non-Virulent Rabies Virus Required to Immunize Mice and Dogs.—*J. Experim. Med.* 1941 [May 1 Vol. 73 No. 8 pp. 661-618.
- ⁸ KLIGLER (I. J.) & BERNKOPF (H.) Immunization of Dogs against Rabies with Culture Virus.—*Science* 1941 [Apr 18 Vol. 83 No. 2116 p. 363.

dogs with most promising results. Of 9 control dogs 7 died after injection of live culture into the neck muscles. Of 13 dogs immunized by an intraperitoneal dose of 10 cc formalized tissue culture or of a formalized suspension of infected mouse brain all remained perfectly well. Neutralization tests demonstrated the presence of antibodies in the sera of the treated dogs. The sera of the immunized animals were able to neutralize 100 mouse cerebral lethal doses of the virus. At the Peiping Union Medical College 383 cases of persons bitten by rabid animals came under observation during the period July 1923 to August 1940. Of these 201 were afforded antirabic treatment (by killed phenol vaccine except during the period October 1937 to October 1938 when dried cords were employed). Nine of the 201 (six treated by killed phenol vaccine) developed rabies in spite of the fact that most of them had superficial wounds located on one of the extremities and most of them started treatment within the first 4 days after the bite. The remaining 182 were persons who either refused treatment or were bitten by dogs which were proved to be normal. Amongst these 18 cases of rabies occurred in five of which there was no wound. These are high mortality rates 4.5% for the treated and 9.9% for the untreated. ¹⁰ considers the possibility that the strain of street virus of the neighbourhood is one of unduly high virulence. That it is not similar to Koritschoner's reinforced virus is shown by the fact that Negro bodies were always found in the brains of the vaccinated persons who died from rabies. Of the 201 treated persons five exhibited post vaccinal reactions. One (of Landry type) died one probably died the remaining three recovered.

[This experience at the Peiping Institute presents very exceptional features (1) the high mortality amongst the untreated who were not severely bitten and five of whom had no bite at all. (2) The unusually high mortality amongst the treated whose bites were not unusually severe and (3) the very high proportion of post vaccinal sequelae. Experimental examination of the characteristics of the Peiping street virus of the strain of fixed virus employed at the Institute and information regarding the characters of the vaccine and the tests to which it was submitted are clearly desirable.]

At the Pinheiros Institute in São Paulo Brazil during the first six months of 1939 Vaz⁹ reports that 648 persons were treated with Fermi's vaccine. In no case did the treatment fail nor were any post vaccinal sequelae observed. The statistics are classified according to the system introduced at the Paris Conference. Treatment is administered at 281 stations. Since the inception of Pasteurian treatment in 1930 only one case of neuromuscular accident has been reported amongst 7920 persons treated.

During the year 1939 antirabic treatment by the method of Semple was administered at Shullong¹⁰ and its 68 outstations to 1,986 persons. Of these 10 died of rabies (0.50 per cent.) one on the second and

⁹ YU (T. F.) Rabies.—*Chinese Med J* 1941 Apr Vol. 59 No. 4 pp. 328-333. [19 refs.]

¹⁰ VAZ (Eduardo) Serviço antirábico descentralizado do Instituto Pinheiros. Estatística do 1 semestre de 1939.—*Anais Inst. Pinheiros* São Paulo 1939 July Vol. 2, No. 4 pp. 73-79. English summary (8 lines)

¹¹ SHULLONG KONG EDWARD VII MEMORIAL PASTEUR INSTITUTE AND MEDICAL RESEARCH INSTITUTE TWENTY THIRD ANNUAL REPORT FOR YEAR ENDING 31st DECEMBER, 1939 [ANDERSON (L. A. P.) Director] pp. 1-2. Anti-Rabic Section. pp. 9-28. Statistical Tables—Anti-rabic Treatment.

one on the third day of treatment. One case of paralytic accident of the fatal ascending myelitis type is reported. With this case the number of paralytic accidents occurring as the result of treatment over the past 5 years has been 1 in 4,520 persons treated."

iv Paralytic Accidents.

During the period 1934-38 UZMAN AKSEL and TUXOMAN¹¹ have observed six cases of paralytic accident at the Institute at Istanbul. Of these five occurred after treatment by living vaccine (Hoegya-Philipps modified) and one after treatment by the killed phenol vaccine of Temple. The total number treated was 9,358 so that the percentage incidence was 0.64. Only one case terminated fatally. The six cases are described in meticulous detail. In one there was no history of a bite in two there had been exposure to cold and great fatigue. The causation of such accidents in general is discussed, and the authors conclude that they occur more frequently with living than with dead vaccines.

v Rabies in Animals

At the desire of the Health Section of the League of Nations GAUTIER¹² has made a comprehensive study of evidence of the efficacy of the preventive vaccination of dogs against rabies.

The problem was discussed at the International Rabies Conference in 1927 and the finding whilst sympathetic was non-committal. In 1928 and 1931 the Committee of the *Office international des épi-zooties* stated that conclusions could not be framed until further observations have been made. The evidence is twofold: in the first place there are the experimental studies made in the laboratory and in the second there is a heterogeneous mass of data relating to practical applications in different countries. As is so often the case the former has illogically lagged behind the latter. Practical application has consequently tended to become empirical conclusions being based upon incomplete information and taking the form of unconvincing and often biased statements. More precision is required and even, let us make bold to say, more frankness.

The paper commences with a concise bibliographical study of experimental work, which the author summarizes as follows: "There is an impression of uncertainty. The ground is not solid: it slips away at each step. Since the experiments are neither coherent nor concordant, they should be taken up once more if possible with quantitative techniques permitting of the comparison of results and

¹¹ UZMAN (Marhar-Ozman) AKSEL (Ihsan Schakir) & TUXOMAN (Zekai-Muham-met). A propos des accidents paralytiques survenant au cours de la vaccination contre la rage—*Arch. Belles-lettres de Méd. Chirurg. et Légers Spécialités*. Paris. 1940 Jan-Mar Vol. 2 No. 1 pp. 23-34. With 4 figs.

¹² GAUTIER (R.). The Preventive Vaccination of Dogs against Rabies. A Critical Review.—*Bull. Health Organization*, (League of Nations) 1940-41. Vol. 9 No. 3. pp. 468-524. (Numerous refs.)

based on the employment of better defined biological agents. A start has been made in this direction. It seems to have been demonstrated that under certain experimental conditions the dog may be preventively vaccinated against rabies. But this is not enough. We want to know definitely whether or not it is possible to confer a sufficient degree of immunity on the dog by means of a single injection of vaccine no matter of what kind provided its innocuity is certain! The start to which Gautier refers is the mouse protection test introduced by WEBSTER and his co-workers at the Rockefeller Institute—a test whereby it is possible to assess the degree of immunity conferred precisely in terms of M.L.D. A further advance lies in the possible utilization of a culture virus of uniform and stable character. Much work remains to be done but a start has been made.

When one turns to records of practical applications the state of affairs is still more unsatisfactory. The author using the machinery of the League of Nations received reports from institutes throughout the world. Some have achieved results which are apparently favourable others have had no success. The stray-dog jackal or wolf obtrudes itself. In countries where these are rife canine prophylaxis necessarily is of little value whilst in converse circumstances some success may be achieved. The data even in the most advantageous circumstances are usually incomplete. the total canine population can seldom be even approximately estimated. the percentage of rabies cases amongst the non vaccinated is not known. Where possible Gautier has had recourse as an index of the efficiency of canine prophylaxis to a reduction in the number of persons applying for Pasteurian treatment. The results are conflicting and even though observed they might equally well be due to other coincident factors such as the spontaneous decline of an epidemic the enforcement of more drastic police measures etc. Indeed, wherever public attention is focussed upon the ravages of a disease by the advocacy of some particular health measure the mere fact that attention has been focussed leads to a tightening up of sanitary precautions in general and often to a beneficial result which may have nothing to do with the health measure in question.

Reports from the various countries are dealt with in some 40 pages of the paper. With regard to these Gautier writes — Of the results referred to above the most conclusive in our view are those relating to Hungary where rabies both in vaccinated and in non vaccinated dogs has entirely disappeared from the regions in which compulsory immunization was enforced before 1938 and where a significant decline was observed in the number of persons having recourse to Pasteur treatment. It is worth recalling that, in Hungary dogs receive one inoculation only. This is an instance of that flagrant contradiction between practical application and the experimental data to which we have alluded at the beginning of the study. In this case however we do not hesitate to put our faith in the practical results.

[Even this result appears to the reviewer to be inconclusive. Sanitary measures were extraordinarily strict—dogs were under very complete control—the focussing of attention had been very great. Though canine rabies was stamped out the figures show that the decline of canine rabies and, in one district at least of persons obliged to undergo treatment had set in prior to the introduction of compulsory canine vaccination thus —

inoculation. Material from the cerebrum, medulla, salivary glands, lachrymal glands, and saliva was infective whether filtered or not. Bile, faeces, urine, abomasal contents, parenchymatous organs, and lymph nodes were not infective. Street virus injected intracranially set up infection after an incubation period of 17-29 days. Material from the cerebrums of unborn calves of infected mothers proved infective. Infection was not set up by feeding infective organ material or milk from infected animals. The virus became more virulent after passage.

The authors agree that the disease is transmitted by blood-lapping bats which can carry the virus in the blood without showing symptoms of disease. The bats infect each other by biting; they can live for several days without feeding and fly very fast for considerable distances. Non-blood-lapping bats, infected naturally or experimentally, may become carriers of the virus.

Cross-immunity tests indicate that the virus is identical with typical rabies virus. There does not appear to be any cross-immunity with the virus of equine encephalomyelitis of Venezuela.

The authors managed with difficulty to cultivate the virus on chick embryos, only one experiment in 24 being successful. Embryonic membranes are infective to laboratory animals after three days incubation. After 7-8 days of growth specific bodies can be seen macroscopically on the membranes; they are between those of psittacosis and laryngotracheitis in size. There are also eosinophile granulations. The incubation period of the disease produced by chick-embryo virus is inconstant. Serial passage of virus in chick embryos becomes difficult, since many embryos do not become infected.

The authors were unable to obtain evidence that ticks are concerned in the transmission of the disease.

They vaccinated 4 000 cattle with phenolized vaccine (street virus) prepared from the cerebrums of naturally infected animals, using Puntoni's technique but with a higher concentration of virus in order to reduce the number of inoculations from 15 to five. The results were hopeful, the immunity produced being proportional to the amount of material injected and never lasting less than eight months. Experiments were also made with phenolized vaccines from chick-embryo virus but the results were not conclusive. 500 animals also were vaccinated with dried, live virus, suspended in normal saline immediately before use. One injection was given subcutaneously and produced considerable local reaction as well as slight general reaction. In a small amount of work done the method appeared harmless and the duration of immunity considerable.

Among the prophylactic measures suggested by the authors are — education of the public regarding the danger of bats; study of the localities where bats are found; destruction of bats (blood-lapping and others); destruction of their nests together with other methods of reducing their numbers; destruction of animals affected with paralytic rabies; protection of animals against bats by providing shelters, illumination at night and by the folding of animals as close as possible to the farmstead; preventive vaccination and control of animal transport.

HELMINTHIASIS

MUELLER (Justus F) & COULSTON (Frederick) Experimental Human Infection with the Sparganum Larva of *Spirometra mansonioides* (Mueller, 1935)—*Amer J Trop Med* 1941 May Vol. 21 No 3 pp 399-425 With 7 figs [28 refs]

Self inoculations were undertaken by each author and the results were watched for several months.

The possibilities that were envisaged before these infections were that more spargana might come into being by asexual reproduction than were injected and that they might degenerate into *S. proliferum* that they might migrate and be lost and that with them a bacterial infection might be introduced.

The spargana were got from an experimentally infected rhesus monkey under aseptic conditions and were washed in 1 in 10 000 merthiolate solution. The tip of the head not over 2 mm long and representing the scolex was cut off from three spargana, suspended in normal saline and injected through a coarse hypodermic syringe into the subcutaneous tissue over the left biceps two into Mueller and one into Coulston. Removals of the parasites were undertaken as follows. From Coulston after 68 days was removed a larva 50 mm long which then lay beneath the deep fascia of the axilla and 12 cm from the site of injection. From Mueller after 69 days a larva 60 mm long which lay within the biceps while at the same time 10 mm of the tail end of the other larva was excised. From Mueller 88 days from the date of infection the rest of the third worm was removed presumably from the biceps and measured 60 mm. long. This last was given orally to a cat which had no ova in the faeces and grew to an adult 50 inches long. Ova collected from the cat's faeces for culture developed normally and when about to hatch the coracidia were placed with species of *Cyclops*. These became infected and were fed to two rhesus monkeys. Some 27 weeks later active spargana were recovered from one of these monkeys so that the use of man as an intermediate host has no apparent effect in lessening the vitality of the species.

Symptoms associated with infection were local induration at the site of the worm periodic giant urticaria, edema and erythema. These periodic symptoms appeared to coincide with movements of the worm which from time to time broke out of the surrounding reaction zone presumably liberating into the circulation walled off toxins. These periodic local reactions were attended by chills and fever and feelings of profound depression and malaise.

Eosinophilia appeared rising to 10 per cent. in Mueller on the 32nd day and to 9 per cent. in Coulston on the 23rd to the 27th day.

A positive skin reaction was elicited to scratch tests or intradermal tests with antigens prepared from *Spirometra mansonioides* adult and sparganum *T. crassicollis* adult and cysticercus, *T. pisiformis* adult and cysticercus, and *T. serrata*. Also with the substance of a plerocercoid found in Great Lakes ciscoes. Antigens for intradermal use were prepared by Dr J T Culbertson of Columbia University. They were not lipid free.

While the subjects were still infected skin testing did not elicit any immediate reaction, only delayed reaction after about 10 or 12 hours.

After removal of the worms the subjects developed an immediate reaction to skin tests while retaining the delayed reaction. The delayed reaction in the case of the scratch tests is recurrent several times at 10 to 12 hour intervals.

"In over 60 control skin tests on volunteers only one false positive was obtained, and that in the case of a student who gave a history suggesting that he may at one time have been infected with a sparganum.

The two authors still show strongly positive reactions to skin tests at the present writing (January 8, 1941) almost 20 months after removal of the worms.

Complement fixation tests were unsatisfactory on the two experimentally infected humans, possibly because of the employment of too weak an antigen, or more probably because the serum was kept for too long a time before performing the tests.

Pathological changes were extensive and in the nature of chronic inflammatory reaction, with local necrotic areas surrounding the worm.

In both subjects the spargana exhibited migration in one case penetrating and forming a gallery in the biceps muscle in the other passing to the region of the axilla. Encapsulation though extensive was not sufficient to wall off the spargana.

With the establishment of *Spirometre mansonioides* as a potential human parasite physicians throughout the geographic range of the worm should be informed of its nature and educated to watch out for it. The use of antigens of tapeworm substance for diagnosis is recommended.

It further appears that this parasite may constitute another potential waterborn disease throughout its range in the eastern United States and render swimming in certain natural bodies of water carrying the copepod intermediate host, or the use of shallow well or spring water etc. dangerous.

"Such antigens as we used are not specific, since they retain the lipid fraction. *Spirometre* antigens elicited positive reactions in hydatid disease patients. It is probable that a more specific antigen can be prepared by preliminary removal of the lipids before extraction.

Clayton Lane

ITAKURA (Jun) Ein Fall von *Ligula mansoni* beim Menschen. [A Case of *Diphyllobothrium mansoni* in Man.]—*Okayama Igakkei-Zasshi* (Mitt. d. Med. Gesellsch. s. Okayama) 1941 Jan. Vol. 53. No. 1 [In Japanese pp. 125-130. With 1 fig. [31 refs.] German summary p. 131.]

Infection with *Sparganum mansoni* occurred lately in Okayama in a woman of 34. A tumour on the inner side of the upper part of the left thigh diagnosed as Atherom was removed and contained two of these larval worms one measuring 17 by 1.5 mm and the other 14 by 2 mm.

C. L.

BRANDT (F. A.) The Differential Staining of the Hooklets of Tapeworms.—*South African Med. J.* 1941 July 26. Vol. 15. No. 14 pp. 277-278. With 3 figs.

Demonstration of *Taenia* hooklets depends ordinarily on their refractive index being different from that of the surrounding medium or tissue. Haematoxylin-eosin staining of sections of hydatid scolices, for example shows up in minute detail the general structure, but the hooklets remain unstained. The author however has found that methyl violet or basic fuchsin when strongly heated will penetrate the hard covering of the hooklet and then is not removed by

the usual treatment by acid and alcohol. He recommends the following methods: one with fuchsin and methylene blue, the other with methyl violet and neutral red.

No 1 Fuchsin-Methylene Blue

- (a) Remove wax and hydrate section by passing through benzol, absolute alcohol, rectified spirit to water.
- (b) Treat with hot concentrated alcoholic basic fuchsin (Verhoeff's) by burning the alcohol, but being careful that the stain does not dry on the slide.
- (c) Treat with 95 per cent alcohol for 30 seconds.
- (d) Wash well in tap water.
- (e) Treat with 2 per cent aqueous sulphuric acid, controlling the degree of decolorization by microscopic examination.
- (f) Wash very well in running tap water to remove all traces of sulphuric acid.
- (g) Counterstain with a 1 per cent aqueous methylene blue solution for two to three minutes.
- (h) Dehydrate and mount in neutral Canada balsam.

No 2 Methyl Violet Neutral Red

- (a) Remove wax and hydrate sections as in No 1.
- (b) Stain for five minutes with a 1 per cent aqueous solution of methyl violet, keeping the temperature of the stain just below boiling point.
- (c) Fix with Lugol's iodine solution for five minutes.
- (d) Decolorize with 95 per cent alcohol, controlling the degree of differentiation by microscopic examination.
- (e) Counterstain with 0.5 per cent neutral red for five minutes.
- (f) Dehydrate in absolute alcohol and mount in neutral balsam.

H H S

BRAILSFORD (James F) *Cysticercus cellulosae*—its Radiographic Detection in the Musculature and the Central Nervous System.—*Brit J Radiology* 1941 Mar Vol 14 No 159 pp. 79-93 With 12 figs.

While doing special health investigation at Birmingham Brailsford found all the tapeworms sent for examination to be *Taenia saginata*; yet during the same period there was no instance during which he found in cattle its larval stage *Cysticercus bovis*, but every year there were discovered in the City abattoir a number of pigs carrying *Cysticercus cellulosae*, the larval form of *T. solium*. This discrepancy it is suggested, may be explained by the observation that the infection in the pig is usually heavy and obtrusive so that the carcass is condemned, and if a lightly infected one slips through the general prejudice against eating underdone pork makes for destruction of the parasite. On the other hand the sparse infection of the ox makes easy the overlooking of the parasite and the general liking for underdone beef enables cysticerci to reach alive a new host.

All the patients Brailsford has found harbouring *C. cellulosae* have been men who have served in the army abroad, mainly in India. An X ray picture does not show up a cyst till calcification has set in and this usually implies a blind period of five years. It is suggested that the deposit of calcium first takes place in the cyst's contents; the radiographic appearances vary with the distribution of calcium and the pressure of the surrounding tissues—the cyst being rounded in heart or brain, flattened between muscle fibres. As to the suggestion that living cysts do little harm and that steps should not be taken to kill them, it is pointed out that they inevitably die as the host ages.

so that some effort to kill them early is justifiable. Striking reproduced photographs accompany the paper including under the heading diagnosis, those of *Trichinella spiralis* and Sarcosporidia. C L.

EWING (Cecil W.) Cysticercosis Epilepsy.—*Brit Med J* 1941 Aug 23 pp. 263-265 [10 refs.]

Out of a large number of necropsies on patients in mental hospitals extending over thirty odd years, this is the only instance of cysticercus epilepsy seen by Ewing.

In a man in whom necropsy demonstrated a diffuse cysticercosis of the brain the clinical picture had been epilepsy with dementia. It differed little from idiopathic epilepsy but there was a more rapid development of dementia, ending in death. The man was 31 an ex-soldier and had a negative Wassermann reaction. On a moderate computation upwards of 100 cysts were scattered over the surface of the cerebrum, mostly in the area fed by the middle cerebral artery. They projected into the cerebral ventricles were present in the basal ganglia, mid brain and right cerebellar hemisphere. There were four in the wall of the left ventricle of the heart, none in the liver. Examination of some muscles showed infection. In some cysts the scolex was obvious. There was no tapeworm in the gut. C L.

DICKSON (W. E. Carnegie) & WILLIS (J. D.) Cysticercosis of the Brain with Epilepsy and Papilloedema.—*Lancet* 1941 Oct 11 pp. 415-417 With 2 figs.

"A case of *Cysticercus cellulosae* infestation with focal epilepsy is described, in which there were the unusual features of grossly raised intracranial pressure and rapidly increasing papilloedema, with a normal ventriculogram.

"The prognosis, though serious is not, as has commonly been thought, uniformly bad."

TORNACK (Joachim Hans) Ueber Zystizerkeninfektion [*Cysticercus* Infection].—*Deut. Med. Woch.* 1941 June 6 Vol. 67 No. 23. pp. 628-630 With 3 figs. [17 refs.]

A man of 44 was admitted to hospital for infarction of the lung. When examined by X rays heavy cysticercus infection of the thoracic muscles was disclosed, it being as the figures show equally extensive in the muscles round the pelvis and left lower limb.

He had indeed thrombo-phlebitis of the left leg. As to his cysticercus infection his battery in 1915 fed in Belgium on raw pork, and though two of his mates got tapeworms he noticed none in himself. He carried a linear scar 8 cm. long on the left side of the back of his head, caused by a hand grenade splinter in the battle of the Marne. He had a lump described as a cysticercus in the neck muscles, and suffered from convulsions. Blood was sent to the Hamburg Institute of Hygiene which reported complement fixation in a titre of 1 in 20, but as the author had no antigen himself the skin reaction was not attempted. Hydatid antigen gave negative results to both tests. Eosinophilia reached 4 per cent. References are limited to Axis publications from 1887 onwards. C L.

STUNKARD (Horace W) Tapeworm Infection in the West Indies.—*Rev Med Trop y Parasit Habana* 1940 Sept.-Dec Vol 6 Nos. 5 & 6 pp. 283-288. With 1 plate. [17 refs.]

DRECHENS (R.) & RENAUDET (R.) La réaction de fixation du complément dans le téniasis à *Taenia saginata* [The Complement Fixation Reaction in *T. saginata* Infection].—*Bull Soc Path Exot* 1940 Vol 34 Nos. 1-3 pp 17-25

HEARIN (James Thomas) Studies on the Acquired Immunity to the Dwarf Tapeworm, *Hymenolepis nana* var *fraterna* in the Mouse Host.—*Amer J Hyg* 1941 May Vol. 33 No 3 Sect D pp 71-87 [33 refs.]

1 A high degree of acquired resistance is produced by an initial infection with *H. nana* var *fraterna* against a second infection. This immunity was demonstrated in one series of experiments to be absolute for at least 102 days after the first infection. Data gained from subsequent experiments have shown that this immunity may remain absolute for 163 days.

2 This absolute immunity to a second infection has been shown to become established in a series of mice as early as 12 hours after infection.

3 It was demonstrated that the immunity remains absolute for at least 141 days after the removal of the initial parasite burden by repeated doses of tetrachlorethylene.

4 No demonstrable active immunity was produced by experimentally introducing by operation the adult stage of this parasite in mice which harbored as many as twelve tapeworms for a period of 9 days before the second infection was administered.

5 No active artificial immunity could be produced by the intraperitoneal injection of as much as 32 cm. of viable adult tapeworms as long as 14 days before infection.

6 An almost complete immunity was produced in previously uninfected mice by repeated intraperitoneal injections of serum from immune animals. It was found that the greatest protection was conferred when all injections were given previous to test infection. These experiments therefore have demonstrated that the immunity to this parasite results from the development of humoral antibodies.

SENKKI (H. A.) Polysaccharide Scolex Antigen for the Immunological Diagnosis of Hydatid Disease.—*Trans Roy Soc. Trop Med & Hyg* 1941 Mar 27 Vol. 34 No 5 pp 401-403

The scolices are collected under aseptic conditions from the fresh fertile cysts from the liver and lung of sheep and cattle. They are then separated from the debris by centrifuging at a low speed, washed three times in saline and finally resuspended in saline to which formalin is added in 0.1 per cent. concentration and stored in the ice chest.

The scolices of the different lots are pooled together and extracted in four volumes of pure acetone at 37°C overnight. The sediment is collected by centrifuging, dried at 37° in the incubator, ground up in a clean mortar, weighed and stored in a CaCl₂ desiccator in the dark.

Three grammes of the powdered scolex material are then extracted in 750 c.c. of N/4 trichloroacetic acid for 48 hours in the ice chest. The supernatant which is very opalescent is separated by centrifuging

On neutralizing the supernatant with 40 per cent. NaOH a cloudy cotton-wool precipitate is immediately formed. The flask is then returned to the ice chest and kept overnight. The precipitate is collected by centrifuging washed twice in absolute alcohol once in ether dried at 37°C in the incubator ground up into a fine powder in a mortar weighed and stored in a desiccator in the dark. The yield is about 5 per cent. of the dried scolex. This powder retains its antigenic potency for a long time in the dark in the desiccator."

"Since the human hydatid fluid had been shown to have poor antigenic properties, it cannot be used for the laboratory diagnosis of hydatid disease. Sheep or cattle hydatid fluid is antigenically very potent. There may be considerable variation between the potency of one batch and that of another. The scolex antigen can be prepared in large amounts and its keeping potency is good, especially in the powder form. It is a poly-accharide and is free of proteins. It is not only a haptene but is also a functional antigen. In the routine clinical laboratory diagnosis of hydatid disease by the specific allergy test of Casoni, it gives uniform and reliable results because a constant uniform quantity of the antigen is used throughout the tests.

GRIEVAL (S. D. S.) CHANDRA (S. N.) & DAS (B. C.) Complement Fixation in Hydatid Disease. Suggestions.—*Indian Jl Med Res* 1941 Jan Vol 29 No 1 pp 203-207 [10 refs.]

From carcasses of freshly slaughtered sheep fluids from a dozen or so cysts are collected by aspiration in separate bottles. To each bottle is added on the spot 0.5 per cent. of a mixture of equal parts of ether and trikresol. The bottles are shaken vigorously brought to the laboratory and left in a refrigerator overnight. Next day the fluids are tested for anticomplementary and haemolytic activity. In Calcutta a dozen fluids can be obtained sometimes on one day from the municipal slaughter-house.

"1. At least six phenolized, selected and pooled hydatid fluids from cysts of freshly slaughtered sheep yield a reliable and stable antigen for a complement fixation test. It is kept in a refrigerator.

"2. The test is linked to the Wassermann reaction.

"3. A group reaction with sera from cases of hydatid cysts of *Cysticercus cellulosae* is possible. The fluid from the corresponding cysts in pigs is not readily procurable.

"4. The complement-fixation test as described can give measurable and repeatable readings which should indicate retrogression of the hydatid disease as a result of non-surgical treatment.

GRIEVAL (S. D. S.) CHANDRA (S. N.) & DAS (B. C.) A Note on Complement Fixation in Hydatid Disease and Associated Considerations.—*Indian Med Gaz* 1941 July Vol 76, No 7 pp. 412-413 [12 refs.]

The antigen is hydatid fluid from freshly slaughtered sheep, selected, pooled, phenolized and preserved in a refrigerator. As a routine the suspected serum is used in dilutions of 1 in 10, 1 in 50, 1 in 100 and 1 in 200; the complement is in a dose of 2 M.H.D. During the last 11 months the tests in five cases have been held to be satisfactory. In one (dilution 1 in 100) the diagnosis was confirmed surgically and microscopically after a positive reaction, the same held in a second in

a dilution of 1 in 50 and in a third in that of 1 in 25 a patient with fits and cysts showed a positive reaction in dilution 1 in 40 a fifth with a reaction at 1 in 10 was left as a doubtful diagnosis In India since 1933 the hydatid infections reported have numbered 46 C L

CULBERTSON (James T) & ROSE (Harry M) Further Observations on Skin Reactions to Antigens from Heterologous Cestodes in Echinococcus Disease.—*Jl Clin Investigation* 1941 May Vol 20 No 3 pp 249-254 With 2 figs. [19 refs]

Antigens suitable for eliciting skin reactions in patients with echinococcus disease can be derived from many different cestodes including (in addition to the specific larval parasite *Echinococcus granulosus*) *Taenia serrata* *T. saginata* *T. crassicolis* *Hymenolepis fraterna* *Monoxia expansa* *Railletina cesticillus* and both the adult and sporogonium of *Diphyllobothrium mansonioides*. These antigens will also elicit skin reactions in normal persons locally sensitized passively with the serum from patients with echinococcus disease C L

BARNETT (Louis) Multiple Abdominal and Pelvic Hydatid Cysts (Peritoneal Cysts) a Study of 228 Cases.—*Australian & New Zealand Jl Surgery* 1941 Jan Vol 10 No 3 pp 223-233 With 7 figs

Of the 1450 records filed in the Hydatid Registry of the Royal Australasian College of Surgeons up to the end of 1939 about 16 per cent. may fairly be classed as peritoneal

The preponderance of males so infected over females is not held to be due to predisposition but to the greater likelihood of a hydatid cyst in a man being ruptured by violence (for this is what is believed to happen in 99 per cent of cases) a leakage in youth being perhaps insidious and overlooked or even forgotten It is noteworthy that DÉVÉ holds that 22 per cent of hydatid cysts rupture sooner or later and that a fertile cyst of average size contains about two million scolices. A rupture into the peritoneal cavity allows these to scatter over it they may be found dispersed in myriads decently interred in a fibrocellular shroud one autopsy having revealed 1089 in a person 45 years old. Obviously most scolices die but it must be gravity that takes them into the pelvis in upright man for when scolices are deliberately injected into the peritoneum of a quadruped they remain about the omentum and mesentery Equally when scolices get scattered on the wound in the abdominal wall through which the peritoneum is reached they may grow in it

In only 16 persons was there a clear history of previous injury (such as might have ruptured a parent cyst) followed by acute abdominal symptoms and anaphylaxis The late symptoms are those of pressure and the tense cysts may rupture into viscera sometimes widely as in the man of 35 who coughed up and vomited cysts and passed others in urine and faeces.

Prognosis is not so bad as painted for the Registry has records of patients coming under surgeons' hands 20 times or more and coming up smiling for yet one more operation one indeed survived 28 but died under the 29th Most live for years and may even reach old

age. Deaths have been 18 per cent, but many patients are still infected and may die later. When an operation becomes necessary too much should not be done at one sitting. pedunculated or near pedunculated cysts may be completely excised, sessile ones may be emptied after preliminary cautious formalage, but the adventitia should be left and the opening of the emptied cavity oversewn. At the first operation aim at manual abdominal exploration to discover the original cyst, but be gentle and beware of bursting a thin-walled cyst, and if there should be recent rupture swab abdominal recesses with ether as Dévé advised. formalin is too irritant. Septic cysts of course need drainage others do not. Pelvic cysts are apt to be a surprise to the gynaecologist. in three of the 228 patients these cysts have made Caesarean section necessary. they should be operated on by the abdominal route without undue delay. C. L.

CALVO MELENDEZ (J.) Equinococosis peritoneal múltiple. [Multiple Peritoneal Hydatids.]—*Rev. Clin. Española* 1941 Apr. 1 Vol. 2 No. 4 pp. 359-363. With 1 fig.

These are reports on two patients with multiple hydatid cysts of the peritoneal cavity both from the Soria Province of Spain.

In one the primary nature of the infection is held to be established, since neither at operation nor autopsy on this girl of 11 was there discovered the remains of a ruptured parent cyst that had burst and seeded the abdomen. At operation one cyst was shelled out of the liver and 24 were removed from the peritoneum, while autopsy revealed three more in the liver. The other patient, an unmarried woman of 27 recovered from operation during which there were found signs of previous inflammation, cysts of the peritoneum ranging in size from a nut to an orange and one attached to the lower face of the liver from which it was easily stripped. Only those cysts from over the iliac fossae were multivesicular. C. L.

JACOBO SPANGENBERG (JUAN) BELGRANO (Carlos Roen) & ZUBINO (Emilio) Ascitis biliar Coleperitoneo hidatídico [Biliary Ascites of Hydatid Origin.]—*Semana Méd.* 1941 Aug. 14 Vol. 48. No. 33 pp. 391-398. With 6 figs.

A man of 49 died two years after acute abdominal symptoms (pain and vomiting) had come on. he had been aspirated to the extent of 7 and 10 litres, but the ascitic fluid did not suggest on examination that it had come from a ruptured hydatid cyst. Necropsy showed a thick walled hydatid cyst in the left lobe of the liver as big as an orange and communicating both with the peritoneum and the bile passages. The peritoneum contained bile-stained fluid with some small unfertile hydatid cysts and the cavity in the liver contained some remnants of the hydatid membrane. C. L.

GARCÍA (JUAN C.) La necinarianas en la provincia de Corrientes. [Hookworm Infection in the Province of Corrientes.]—*Bol. Sanitario* Buenos Aires, 1940 Sept.-Dec. Vol. 4 Nos. 9 10 11 & 12. pp. 615-627.

Combating of hookworm infection on a mass scale may either be by the institution of dispensaries to which the people come, or by a sanitary campaign in which the staff go to the people.

The setting up of a dispensary in a centre of population excites interest and induces cooperation later both decline but the dispensary may continue to play an important part in the sanitary campaign. This last may take one of three lines (a) The intensive method with a census of the population examinations of the faeces of all persons treatment of all infected and the construction of latrines. Its inconveniences are held to be (1) all stools will not be got (2) light infections will probably escape detection (3) many will refuse treatment (4) only in small communities can it be put through (b) Mass treatment in the sense that if preliminary test examinations show 50 per cent infected the whole population will then be treated (c) Smillie's method namely treatment of the sick. In this method since it is held that larvae do not live in the soil for more than two months and infections are got little by little varying procedures are employed (1) with heavy infections and no latrines (no evidence of cooperation) there is a yearly treatment to reduce infection to a carrier state (2) where the building of latrines is possible three treatments are given thus getting time to erect latrines in three-fourths of the houses and thereafter another campaign of treatment and of propaganda intense enough to persuade the people to have latrines in all houses (3) with light infections, treatment and latrine erection. There is sketched the way in which since SMILLIE worked in 1922, the campaign has developed in the Province and particular mention is made of the activities of the Penna Institute which have resulted in the lessening of numbers of the sick and in increasing capacity for work. An issue of a six-monthly certificate of depopulation to a population in which 30 per cent are illiterate is advised [presumably after re-examination and if necessary treatment]

C L

OHARA (Sinken) Observations on Hookworm Disease in Isigaki Island, Okinawa Prefecture. II. Studies on the Mode of Infection of Hookworm among the Population in Kabira Village especially on the Relation of Soil Infection by Hookworm Larvae to Occupation and Habits of the Population, Domestic Animals, Soil and Atmospheric Phenomena.—*Taiwan Igakka Zasshi (Jl Med Assoc Formosa)* 1941 July Vol 40 No 7 [In Japanese pp 1212-1223 With 1 map English summary p 1223]

In Isigaki island the maximum temperature is 26-41°C. lowest 20-25° average 23-31 rainfall is 2,296 mm average humidity 78-8 The highest rate of infection with hookworm larvae in soils was 100 per cent. in melon fields 27-3 in sweet potato fields 25 in mulberry fields and in vegetable manure heaps 21-4 in sugar-cane fields. Sandy soil has more larvae than sandy humus clay contains fewest larvae

In the faeces of 50 pigs *Ascaris* eggs were found in 21 *Strongyloides stercoralis* larvae in 1 and doubtful hookworm eggs in 2. C IV

BUCKLEY (J J C) Observations on the Vertical Migrations of Infective Larvae of Certain Bursate Nematodes.—*Jl Helminthology* 1940 Dec Vol 18 No. 4 pp 173-182. With 12 diagrams.

The technique consists in making on a 3 x 1 in. glass slide by a writing diamond the marks seen in the figure. By brush or pipette infective nematode larvae are spread on the 2 mm wide strip some water is

veins, oedema, ulcers and digestive troubles diarrhoea being apt to end life. Puncture of lymph nodes disclosed no trypanosomes the urine is normal and there are no other constant symptoms. The average percentage of haemoglobin in the blood varied in different groups between 62.4 and 42.4 the colour being least in those in whom oedema or pigmentation were greatest. The red corpuscles were ortho- or hypochromic and had little evidence of regeneration, there being few nucleated cells which were normoblasts and reticulocytes being fewer than normal. From September to December diet consisted mostly of unvaried manioc bread, and it was then that diboba was at its height. Three groups were treated one of 18 with unworming and perchloride of iron showed remarkable progress a second of 15 without unworming but with iron showed slight improvement a third of 6 with unworming and no iron showed no improvement except a slight gain in haemoglobin C L

NAPIER (L. Everard) DAS GUPTA (C. R.) & MAJUMDAR (D. N.) The Treatment of Hookworm Anaemia.—*Indian Med Gaz* 1941 Jan Vol 76 No 1 pp 1-11 With 13 graphs.

The paper deals with investigations on 36 Indians (32 men, 3 women and 1 child) who showed hypochromic anaemia, and in whom hook worm infection seemed to be its sole cause.

In the absence of deficiency of dietary iron, absolute or relative even a heavy load of hookworms produces no anaemia. Rice particularly when polished, is poor in iron people whose food it is have little iron stored, are on the verge of iron starvation, and cannot meet in full the demands of blood loss or of pregnancy nor to meet a coming demand, can the store be increased beyond the normal level. On the other hand when diet is rich in iron the balance between absorption and loss of the metal can be maintained in spite of a heavy hookworm load.

Of the 36 patients 9 had less than 2,000 eggs per gramme of faeces, 10 had between 2,000 and 10,000 17 had over 10,000 of 28 patients, 6 had achlorhydria, 6 had hyperchlorhydria and in 16 the acid was within the normal range. The egg count was below 2,000 per gramme in 5 of the 6 persons with achlorhydria. of nucleated red cells got on sternal puncture between 30 and 50 per cent. were normoblasts in 20 of the 30 patients in whom this point was investigated. Reticulocyte response did not give a reliable prognosis. These are the conclusions drawn from observation of these 36 anaemic patients.

Anthelmintic treatment without iron treatment is of little immediate value.

"Even in a very anaemic patient, a return to the normal haemoglobin level can be achieved by treatment with iron alone in most cases, but this level will not be maintained unless the hookworms are now removed.

"A slightly better response to iron treatment will be obtained after deworming, but the difference does not justify the risk of treating a patient with a very low haemoglobin level by anthelmintics.

There was no evidence in the subjects under investigation of a copper or manganese deficiency and there does not appear to be any advantage in adding these metals to the medicinal iron.

"There is some evidence that, grain for grain of metallic iron, ferrous ammonium sulphate in dextrose solution is a more efficient preparation than ferrous sulphate in tablet form.

"Two courses of treatment are usually both necessary and sufficient to raise the level of a very anaemic patient to the normal level the courses

we gave consisted of 18¹/₂ grains of ferrous sulphate (exsic.) or 18 grains* of crystalline ferrous ammonium sulphate in dextrose solution daily in two or three doses for 3 weeks. It is suggested that 4 c.cm. of tetrachlorethylene as an anthelmintic be given in the interval between the two courses of iron administration. In mild cases where only one course is likely to be necessary the anthelmintic treatment can be given coincidentally with the iron treatment.

Our observations support the accepted theory that the anaemia of hookworm infection is due mainly to blood loss but indicate that there is some other minor factor operating which we suggest is most probably failure of absorption as a result of intestinal mucosal dysfunction.

C L

BODON (George R.) A Case of *Strongyloides stercoralis* Infestation.—*Jl Lab & Clin Med* 1941 July Vol 26 No 10 pp 1608-1611 With 5 figs.

A case of an Italian immigrant woman is presented in which the stool examinations revealed rhabditoid larvae of *Strongyloides stercoralis*.

It may be assumed that the parasite caused uncertain abdominal symptoms for which the gall bladder and the appendix were removed. Later two laparotomies were performed for the persistence of symptoms which were thought to be due to postoperative adhesions. All operations resulted in negative findings.

The stools of the husband and the children were also examined, and the parasite was found to be present in the husband's stool. The blood count of the husband showed eosinophilia of 10 per cent. but otherwise he did not show any symptoms which could be related to the presence of the parasite. Both individuals undoubtedly acquired the parasite in Italy.

TOMITA (Susumu) On Local Reaction of Infected Skin, Clinical Symptoms and Changes in Blood Picture in Experimental Human Infection with *Strongyloides papillosus* and *S. fülleborni*.—*Taiwan Igakka Zasshi (Jl Med Assoc Formosa)* 1941 Mar Vol. 40 No 3 [In Japanese pp 427-442 With 7 charts & 6 figs on 1 plate. [10 refs.] English summary pp 442-443.]

The author describes the local pain and itching and the local skin lesions produced, when infective larva of *Strongyloides papillosus* and *S. fülleborni* are applied to the human skin. *S. papillosus* does not infect man so that although there is penetration of the skin there are no general symptoms but *S. fülleborni* does infect man eggs are subsequently passed in the faeces and there may be general urticaria with or without fever. Eggs are found sometimes as early as 16 days after infection, and larvae have been found by faecal culture as long as 11 months after infection. The blood changes which are slight, are referred to [See this Bulletin 1941 Vol 38 p 517.]

C IV

ESTRADA (Juanuario) & GARCIA (Enrique) *Ascaris lumbricoides* in the Common Bile-Duct Report of a Case.—*Jl Philippine Med Assoc.* 1941 July Vol. 21 No 7 pp 331-336. With 1 plate [30 refs.]

Ascaris has been found in the biliary passages after death. Its discovery there during life at operation is here described in two patients.

* We are now using 44.5 gr. daily—
better results.

scribed, and getting even

and in both of whom there were stones in the gall bladder [Does not this suggest that the passage of a stone may so dilate the common bile duct that it no longer properly contracts and guards against intrusion of a worm?] C L.

DUBOIS (R.) & NICOT (L.) Recherche et dosage des anticorps dans l'ascaridose par la méthode de la fixation du complément. [Antibodies in Ascaris Infection.]—C R Soc Biol. 1941 Apr Vol. 132 No. 7-8. pp 816-820

SWARTZWELDER (John Clyde) *Toxocara cati* (Cat Ascarid) Infection in Man. Report of an Additional Case.—J Trop Med & Hyg. 1941 May 15 Vol 44 No 10. pp 61-62. With 1 fig

Toxocara cati infection in the human host is very infrequent although the exact number of cases on record is not entirely clear additional, apparently authentic, case is put on record herewith.

DERMATOLOGY AND FUNGUS DISEASES

DR BORG. Le traitement des epidermophytes interdigitales. [The Treatment of Interdigital Ringworm.]—Schweiz Med Woch 1940 Dec 14 Vol 70 No. 50 pp. 1223-1225

It is claimed that the three best known varieties of fungus are *E. inguinale* of Sabouraud, the *E. interdigitale* of Kaufmann-Wolf and the *E. rubrum* of Castellani. Clinically the three are indistinguishable but all show periods of quiescence and activity. The signs and symptoms are always more violent on sweaty feet and secondary infections may mask the underlying condition. Generalization is sometimes seen and the lesions may then simulate pityriasis roses or a discoid dry eczema. It is suggested that a sympathetic mechanism is involved in the development of the epidermophytes of the hands. Simple microscopy is insufficient to establish the diagnosis. There has been a great increase in the detected cases during the last few years. This is partly due to greater knowledge of its existence, to the common type of life seen in sport clubs, etc. and there may also be some actual increase of the prevalence of the fungi in nature owing to meteorological or atmospheric conditions undetected by us, just as climate causes variations in other vegetable fungi in woods, etc., from year to year.

Only about one-quarter of this paper is actually devoted to treatment. The author recommends one or two per cent iodine in alcohol for chronic cases. Wet dressings under gutta percha help the acute cases. Often one erythema dose of X rays is successful when it is followed by three weeks of the iodine treatment. As the usual routine, however he advises bathing of the feet in a 1 in 4000 aqueous solution of permanganate of potash containing one half per cent. of common salt. All bullae are broken and the feet generally "cleaned up." The following paint is then applied. 20 per cent. of acetone 2 per cent. of iodine and 80 per cent. of alcohol, in water. When this

application has dried the feet are dusted with a powder consisting of equal parts of zinc oxide talc and bismuth subnitrate. A light gauze dressing is then applied. The claim is made that this method produces cure in about three weeks. It is noteworthy that there is no mention whatever of the sterilization of socks etc.

Sydney Thomson

STEPHENS (Frances L.) Preliminary Laboratory Tests on the Fungicidal Action of Copper Sulphate and Para Nitrophenol on Dermatophytes. With a Corollary by Surgeon Lieutenant-Commander P K FRASER.—*Jl Roy Nav Med Serv* 1941 July Vol 27 No 3 pp 273-281 [Summary appears also in *Bulletin of Hygiene*]

Interest in this subject was aroused by the hope of developing a prophylactic bath. The resulting laboratory work may be summarized briefly and although its results are not encouraging there is always the fact that clinical experience often proves more hopeful than might be expected. The arguments on this point are discussed in the corollary by Fraser. It was found that a 2 per cent aqueous solution of copper sulphate required five hours to kill *Tr rubrum* and the same result. Thirty minutes application proved lethal to *E floccosum* when a 20 per cent solution was used but this same solution took one hour to kill *Tr rubrum*. Using a saturated aqueous solution of paranitrophenol the same differences are seen thirty minutes being sufficient to kill the one fungus whilst two hours were needed to deal with the Tricophyton. Both were killed in about 15 minutes when this solution was used *in vacuo* but when the strength of the paranitrophenol was reduced to 1 per cent. 30 to 60 minutes were necessary.

S T

DEY (N C) & MAPLESTONE (P A) *Trichophyton crateriforme* in India.—*Indian Med Gaz* 1941 July Vol 76 No 7 pp 410-411 With 4 figs. on 1 plate

This organism received its present name in 1902 when it was studied by BODIN. SABOURAUD wrote the original description however when he called it the *Tr megalosporon endothrix*. The authors of this paper claim that their seven cases constitute the first report of its occurrence in India. All the patients were Anglo-Indian girls aged between 7 and 13 years who were members of a boarding school in Calcutta. Each was a case of tinea tonsurans but all showed one feature which seems to be very important in the clinical diagnosis. The scalp bore a thick layer of greasy scales in which the hair stumps were so embedded that they showed only as small black specks the black dot ring worm. The morphology and cultural characters of the fungus are described in detail.

S T

BRICEÑO-IRAGORRY (L.) Nota acerca de dos casos de Tinea Endotrix [Two Cases of Infection by *Tinea endothrix*].—*Bolet Laboratorios Clinica Luis Razetti* Caracas 1941 Feb Vol 1 No 3 pp 65-67 With 1 fig

Until 1939 the forms of *Tinea tonsurans* recorded in Venezuela states the author were *T endothrix* the parasite being *Microsporum*

felinum. In 1939 Dr Paul GUERRA reported 11 cases of fungal infection four of *Trichophyton sabouraudii* six varieties of *T. tonsurans* and one of *T. rubrum* the last causing *Exema marginatum* of Hebra.

Two cases were seen by the author in private practice in 1940 one a girl of five the other a boy of 10 years. The former presented small patches with ill-defined edge scaly centre and broken hairs the condition had been in progress for six months the latter showed a single patch, the size of a 5-bolivar-piece, crusted, on the occipital region, also with diffused edge and hairs matted in the scalp. It had been noticed for a year.

Culture on Sabouraud's medium gave two types of colony one large powdery with creamy yellow centre whiter towards the periphery crateriform in the middle with radiating fissures. The other type was fluffy and downy (dovetosa) white less powdery and smooth. In the former was abundant sporulation with many conidia and simple or ramifying conidiophores, and very rarely intercalary chlamydospores. In the latter conidia were less abundant from numerous chlamydospores. The fungus was identified as *Trichophyton tonsurans* better known as *T. crateriforme* Sabouraud 1902. The latter in the opinion of CARRON is merely a variant of the former.

H H S

SHAW (Frederick W.) & REID (J. Douglas) Fungi and Fungous Diseases.—J. Lab & Clin Med 1940 Oct Vol 28. No. 1 pp 258-282. With 3 figs. [18 refs.]

This article is really devoted to three of the more obscure mycotic lesions. It is intended to remind readers of their existence and so only such points are mentioned as may assist in rapid differential diagnosis. CHROMOMYCELOSIS affects the skin only and does not appear to invade the other organs. Its warty and nodular appearance demands differentiation from tuberculosis verrucosa cutis, blastomycosis Madura foot and coccidioidal granuloma. Under the microscope the causative organisms differ from Blastomyces dermatitidis by their dark colour and by the absence of endospore formation. *Exema marginatum* is distinguished by the presence of budding forms. Small in that fungus. TORULA MEXICORITIS, of which there are 64 examples in the literature, is protean in its clinical manifestations. Usually the patient is either quite afebrile or has only a low grade fever. The disease lasts weeks and has been known to persist for a number of years. The calf shows 100 to 500 cells per cc lymphocytes predominating. The oval yeast cells are present in it and are Gram-positive and 5-8 μ in diameter. Mice and rats are susceptible to this *T. histolytica* thus being useful in its detection. The more virulent strains show large capsules. There is no known treatment apart from the usual symptomatic measures. SYSTEMIC HISTOPLASMOSIS is caused by *H. capsulatum* but is exceedingly rare. Onset is insidious with weakness and loss of weight. Sweats may occur. There is an irregular fever an enlargement of the spleen, liver and lymphatic glands. Leucopenia and secondary anaemia are present. The parasite may be found in the cytoplasm of the large endothelial-type cells the blood. When stained by Wright's method the fungus shows as bluish oval cells 2-4 μ in diameter each being surrounded by a clear

capsule-like substance. Under the appropriate conditions cultures also show a mycelial type of growth. The most suitable experimental animals are guinea-pigs. Nothing so far is known about treatment as only two cases have been diagnosed during life and then only very late in the course of the disease

S T

SMITH (Leslie M) *Blastomycosis and the Blastomycosis-like Infections*—*Jl Amer Med Assoc* 1941 Jan 18 Vol. 116 No 3 pp 200-204 With 5 figs [18 refs]

The author prefers to reserve the name blastomycosis for lesions caused by the species of fungus described by Gilchrist and named *Blastomyces dermatitidis* and to apply appropriate names to the other somewhat similar diseases caused by other species of fungi including the mycotic granulomas in which yeast like cells are found. He insists that clinical characteristics although suggestive are usually not sufficient for accurate diagnosis and that identification of the organism must be made as soon as possible. In most cases study of the cultures is necessary. Intracutaneous tests with fungus antigens assist but are not absolutely specific. Geographical distribution may help a little.

The extreme adenopathy of paracoccidioidal granuloma suggesting Hodgkin's disease the marked fungating character of chromomycosis the polypoid tumours of rhinosporidiosis the gelatinous contents of torular abscesses and the kala-azar like syndrome of histoplasmosis are distinguishing clinical features in many cases. The verrucous surface and milium abscesses of blastomycosis have also been imitated in superficial coccidioidal granuloma and deep moniliasis. Among the other diseases here considered are sporotrichosis and scopulariopsis. The paper contains many useful tables showing the comparative features clinical pathological and mycological

S T

BUSH (J D) *Severe Generalized Blastomycotic Dermatitis. Report of a Case*—*Arch Dermat & Syph* 1941 Mar Vol 43 No 3 pp 485-490 With 4 figs.

An Alabama negro aged 48 gave a total history of only four months. The eruption then started as dry white elevated patches on the fore arms. The typical warty lesions developed later and also appeared on the body in scattered areas whilst the face became thickly involved. This paper is chiefly concerned with the question of treatment. Iodide of potash was given in doses of 360 grains daily. At the same time the U.S.P. compound solution of iodine was administered intravenously. At first 15 minims were given daily later this dose was increased to 30 minims and was continued for six weeks. One gramme of sodium thiosulphate was mixed with each dose a suggestion originally made by RAVAUT who hoped to preserve the veins and prevent clotting by this means. X-rays were also given but the doses are not noted. Great improvement was seen after seven weeks, so that only the iodide of potash was thereafter given until three months had elapsed after his admission to hospital. By then cure seemed apparent and in fact the man was still quite well when seen two years later

S T

WEIDMAN (Fred D.) & ROSENTHAL (L. H.) *Chromoblastomycosis*
a New and Important Blastomycosis in North America. Report of
a Case in Philadelphia.—*Arch Dermal & Syph* 1941 Jan.
Vol. 43 No. 1 pp 62-82. With 5 figs. [34 refs.]

It is the main purpose of this paper to publicize the rapid expansion of the geographic distribution of chromoblastomycosis and to indicate the enlarging scope of the morbid anatomic changes. There is promise that the range in gross tissue reaction will eventually compare with that of tuberculosis syphilis and other members of the group of specific infectious granulomas. The case, seen in Philadelphia, was that of a negress aged 44 years whose disease began some 10 years earlier. When first seen there were three fungating lesions on the left ankle with abscesses in their centres. No real verrucous changes were seen. Treatment with iodine internally and with radiotherapy produced great improvement. Diffuse local nodes were subsequently dispersed by iodide of potash so that some five years later there was a pigmented patch with but two small active areas, which clinically suggested a late nodular syphiloderm.

Beautiful photographs illustrate the histological and cultural reports. *Fonsecaea* [*Hormodendron*] *pedrosoi* having been isolated. The changes seen extend from mere infiltration with erythematous squamous patches, through discrete gummatous nodules to exaggerated verrucosities. The authors discuss the history of the disease and its geographical distribution very fully. The dermatologist must be conscious that this infection must now be reckoned among the distinct possibilities in granulomas of undetermined nature as well as in verrucous dermatoses in general. It must also be realized that whilst the condition has been confined to one of the lower extremities in most known cases exceptions have been discovered with increasing frequency in recent years, e.g. the hand is not uncommonly affected, whilst lesions have been detected on the arms buttocks face and neck.

S T

EMMONS (C. W.) HAILLY (Howard) & HAILLY (Hugh) *Chromoblastomycosis*. Report of the Sixth Case from Continental United States.—*Jl Amer Med Assoc* 1941 Jan. 4 Vol. 118 No. 1 pp 25-28. With 5 figs. [13 refs.]

The authors describe this the sixth case seen in the U.S.A., the patient being a man 68 years of age and a native of Atlanta. The lesion was said to be of three months duration and was situated on the back of the left wrist where it covered an area four cm. in diameter. The raised bluish-red patch was boggy to the touch and bore multiple points of discharge. Cultures proved the organism to be *Hormodendron pedrosoi*, the description of which is supported by good photographs. It is claimed that the man was cured after three months treatment, but his subsequent death in an accident rendered prolonged observation impossible. On the first day 150 R units of X-rays were administered, this being followed a fortnight later by a further 75 R units. Iodide of potash was given as a saturated solution starting with thirty drops three times a day after meals. Thereafter each dose was increased by one minim daily so that 20 days later the man was taking 50 minims three times a day. Reduction of the

dose was then carried out along the same lines, so that in three weeks time he was back on half a drachm three times a day which dose was then continued until the three months were complete S T

NIÑO (Flavio L.) Micetoma podal maduromicótico con granos blancos por "*Monosporium Apiospermum* en la República Argentina. (Estudio micológico de una observación.) [Madura Foot due to *Monosporium apiospermum* in the Argentina.]—*Bol Inst Clin Quirúrg* Buenos Aires. 1941 June-July Vol. 17 No 141 pp 483-509 With 23 figs [43 refs]

The patient was an unmarried man of 28 years of age who a year before coming under the author's observation had punctured his foot with a pine needle. A typical fungoid condition followed, with extension to the deeper structures and sinuses discharging white granules. There is nothing particular to remark about the clinical condition except perhaps its rapidity of development. It is however described in great detail by Professor Niño because it is the first case of pedal maduromycosis with white grains to be recorded in the country and the causative fungus has not previously been known to cause disease in the Argentine. The article is excellently illustrated with photographs of the foot and with X ray reproductions, together with photomicrographs demonstrating the histological changes and cultures of the fungus on Sabouraud's glucose medium. H H S

COSTA (Oswaldo) & JUNQUEIRA (Moacyr A.) Mycetoma podal. Observação clinica de um caso [A Case of *Mycetoma pedis*].—*Brasil-Médico* 1941 May 10 Vol. 55 No 19 pp 333-335 With 5 figs. English summary (2 lines)

This case is placed on record because the disease is said to be rare in Minas Geraes this is the fourth to be reported. The patient was a man of 52 years who noticed the early stages—a small painless swelling the size of a millet seed beneath the skin. This increased very slowly and when seen by the authors there was swelling involving the whole foot with sinuses discharging whitish yellow granules. Radiological examination showed rarefaction of the os calcis astragalus and cuboid. H H S

ALMEIDA (F) & BARBOSA (F A Simões) Contribuição para o estudo de *Cephalosporium recifei* [Description of *C. recifei*].—*Arquivos do Inst. Biol* São Paulo 1940 Vol. 11 pp. 1-4 With 5 figs. on 2 plates English summary

The authors following their studies on maduromycosis in Brasil describe for better documentation the *Cephalosporium recifei* Leão and Lobo. They found a characteristic appearance on Czaplewsky's medium.

The fungus was obtained from a case of mycetoma in Pernambuco and it is the first case of mycetoma produced by a specimen of this genus registered in medical literature.

DANGERFIELD (L. F.) & GEAR (James) Sporotrichosis among Miners on the Witwatersrand Gold Mines.—*South African Med J* 1941 Apr 12. Vol. 15 No. 7 pp. 128-131 With 2 figs.

Some 74 cases are analysed in this paper. Only six cases were seen in European miners, the remainder occurring in natives. From one mine there came 17 patients, most of whom worked in one shaft on timbering. The rest all worked in one shaft of a second mine but at very different levels. It cannot be said that any particular type of work was dominant as the infection appeared in some who were lashing, timbering, machining, washing rock and even in some transport men. The disease usually developed at the site of known injury, thus 23 of the 57 men from the second mine gave a definite story of antecedent trauma. This was mostly chafing on rock, but a few told of splinters from the timber. The incubation period varied from three days to three weeks, the primary lesion usually being on the forearm or wrist. There it developed as a small granulomatous ulcer which later became surrounded by minute nodes. These gradually became confluent and then in turn broke down to make the edge still more irregular. Occasionally multiple primary foci were seen. The secondary deposits appeared one or two weeks after the primary site had become evident, occurring as small hard nodules along the course of the draining lymphatics. These in turn then broke down. Retrograde lymphatic spread was seen occasionally. Some confusion might be caused by the adenitis resulting from secondary pyogenic infection. Spontaneous healing is known but the authors produced cure by intensive doses of iodide of potash, reaching one drachm three times a day by the third day of treatment. This was continued for three weeks. All attempts to trace the sources of infection were unsuccessful. S T

LAFFER (Norman Callender) A Note on *Saccharomyces fragilis* Jorgensen associated with Pathologic Conditions in Human Beings.—*Jl. Lab & Clin Med* 1940 Nov. Vol. 28 No. 2 pp. 294-298

This report is solely concerned with an organism isolated by Miller in 1835 and classified by him as *Monilia pseudotropicalis* Castellani. Diddens and Lodder considered this to be an imperfect stage of *Saccharomyces fragilis* Jorgensen. These confusing results are always liable to occur as it is difficult to stimulate ascospore production in some strains. The patient from whom this particular strain was isolated had an acute follicular tonsillitis with all the usual systemic disturbance. Recovery occurred after the administration of diphtheria antitoxin. The first case in which the organism was found had a tonsillitis too but the only other report claimed its isolation from the "lung of a tuberculous patient." The fungus is actually by no means rare and has been found in cream from Illinois, milk from Copenhagen and from Switzerland, in yogurt from Germany and matzoon from Armenia. The paper contains very full cultural, morphological and biochemical details. The findings confirm the work of DIDDENS and LODDER. S T

COYANT (Norman F.) A Cultural Study of the Life-Cycle of *Histoplasma capsulatum* Darling 1906.—*Jl Bacteriology* 1941 May Vol. 41 No. 5 pp. 563-574. With 3 plates. [28 refs.]

* 1 A strain of *Histoplasma capsulatum* from a fatal case of histoplasmosis in a three-months old infant is studied.

2. The saprophytic filamentous form developed on Sabouraud's glucose agar at room temperature is characterized by large tuberculate chlamydospores not asci as proven by appropriate staining methods.
3. The filamentous form is converted to the yeast like tissue form without the use of animal inoculation by cultivation on sealed blood agar slants at 37°C
4. From a cultural study of the complete life-cycle of *Histoplasma capsulatum* it is shown that the fungus should be placed in the Moniliales of the Fungi Imperfecti

VAN PERNIS (Paul A.) BENSON (Miriam E.) & HOLINGER (Paul H.)
Specific Cutaneous Reactions with Histoplasmosis. Preliminary Report of Another Case—J Amer Med Assoc 1941 Aug 9
 Vol. 117 No 6 pp 436-437

A man 63 years of age suffered from hoarseness loss of weight and abdominal pains. Examination of the larynx showed a polypoid growth on the cord and involvement of other structures. Tissue removed by biopsy revealed an infection with *Histoplasma capsulatum*. Cultures of the organism were obtained and mice were infected. Specific immediate and delayed skin reactions were produced both in the patient and in infected mice by injection of filtrates from broth cultures. The specific substance in the filtrates was precipitated by acetone and was readily soluble in saline solutions. In spite of numerous remedies administered with a view to controlling the disease it progressed steadily the patient dying six months after the diagnosis of histoplasmosis had been made.

BOLETÍN DE LA OFICINA SANITARIA PANAMERICANA. 1941 Mar
 Vol. 20 No 3 pp 215-219 English summary Algunos
 datos sobre el carate en Venezuela. [Pinta in Venezuela.]

The first medical writers to study carate in Venezuela were the Freites and the Pinedas they were followed by Padilla (1908) Medina Jiménez (1916) Vagas (1918) Iriarte and Briceño Rossi. According to the last two investigators carate is found in the States of Anzoátegui, Bolívar Barinas Miranda Lara, Portuguesa and Zulia and the Territories of Delta Amacuro and Amazonas. Recently a scientific expedition to study the disease and its etiology in the four Guatire and El Consejo States of Miranda and Aragua composed of Drs. Fernández Vegas O'Dally Guerra, Pisano Iriarte and Briceño and the foreign scientists Brumpt (Jr and Sr) Jaffe Mayer and Sánchez Covisa, was organized by the National Institute of Health of Venezuela. These investigators found the *trypomonas* described by Cuban writers in untreated Venezuelan cases of the lead or bluish-coloured type of carate the organism was relatively rigid with regular narrow spirals (12 to 15 microns wide) and its motility decreased about 20 minutes after the specimen was taken. With the Glemsa or Fontana stain it was very similar to *T. pallidum* and *T. perenne*. Inoculation in guinea pigs rabbits and rats was negative. Over 50 per cent of the cases seen had gland swellings resembling those of syphilis. The typical colour of the carate lesion was lead grey often with bluish tones sometimes almost black. The achromatic patches occasionally showed a pinkish tinge. It was felt that there were two kinds of decoloration one an active type modified by treatment the other residual. In the active

type the hair retained its normal color in the latter it became white. No hyperkeratotic or peeling lesions were seen. Bradycardia was present in a high percentage of cases and slight blood changes (lymphocytosis and eosinophilia) were seen in some. It was noted that pigmentation was not limited to the basal layer of the skin, but extended into the prickle layer there were many chromatophores in the dermis. In the epidermis atrophy of the mucous body often marked, was observed in some parts there was a pronounced morphologic change, with disorganization of the basal layer and irregular arrangement of the remaining cells in some places heterotopic mitoses were seen with infiltration of dermic cells (sometimes lichenoid in appearance) into intracellular spaces.

LEÓN Y BLANCO (Francisco) Estudio epidemiológico del mal del pinto en una pequeña aldea del estado de Guerrero (Mexico) [Epidemiological Study of Pinta in a Small Village in Guerrero.]—*Rev Med Trop y Parasit Habana* 1940 July-Aug Vol 6 No 4 pp 185-200 [16 refs]

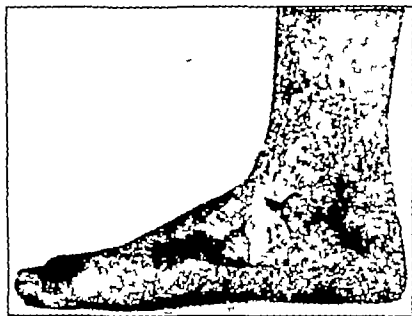
The village referred to is Tecumatlán which lies in the valley of the Balsas river which runs between Guerrero and Michoacan. The inhabitants altogether number only 234 and of these 71 (30.3 per cent.) present the dyschromic stage of mal del pinto six are in the general dissemination stage and seven show merely the initial lesions, together 84 or 35.9 per cent. of the inhabitants. Forty three stated that they had had a local rash or pintado (for example) before the maculae condition, such as ringworm. *Empoine* is used for a cutaneous appeared 20 had not while another eight did not know. As regards sex there was little difference 48 were male 33 female (but the relative numbers among the inhabitants are not stated). A list of the inhabitants is given in families with a note as to which members were attacked. Whether the disease is contracted by contact or by vector is not certain there is no proof of the latter though the former has undoubtedly been shown to be possible experimentally. H H S

CARRIÓN (A. L.) RUIZ NAZARIO (R.) & HERNÁNDEZ NORALES (F.) Mal del pinto en Puerto Rico [Pinta in Porto Rico]—*Bol Asoc. Med de Puerto Rico* 1941 Mar Vol 33 No 3 pp 104-106

The patient was a woman of 32 years a native of Patillas, Porto Rico who complained of certain discoloured spots on the skin which first began to appear five years before. Apart from these spots she seemed to be in excellent health. The spots or blotches were of varied sizes and were present on the face, neck, shoulders and arms. Some had slightly raised edges. Scrapings revealed no fungi. Wassermann and Kahn tests gave negative results. Tissue taken by biopsy and stained by Levaditi's method showed no spirochaetes. Eleven months later characteristic *Spirochaeta karoyi* were seen by dark ground examination of the lymph obtained by scarification of the skin of the parts affected. Salvarsan was injected but was badly tolerated and had to be stopped after four doses and bismuth malleolate was substituted, and the blotches had greatly improved when after six weeks the patient ceased to attend and passed from the authors' observation. The disease is probably not very rare in Porto Rico. H H S

LEÓN Y BLANCO (Francisco) Las queratosis palmares y plantares en el mal del pinto [Palmar and Plantar Keratosis in Pinta.]—*Rev Med Trop y Parasit Habana*. 1940 July-Aug Vol. 6 No 4 pp 167-184 With 11 figs

Keratoderma is a late manifestation of pinta and is always accompanied by widespread dyschromia. It is characteristic in the second or generalization stage. The affected surface is irregular and friable (desmenuzada) and covered with adherent greasy scales and showing deep cracks perhaps exuding bloodstained serum in which *Spirochaeta herreysii* may be seen. In the foot the part from the heel to the metatarsophalangeal prominence is usually invaded but the lesion may



*Keratoderma in Pinta.

[Reproduced from *Revista de Medicina Tropical y Parasitología*.]

extend to the toes. The heel and midplantar region are always more affected than the rest of the sole. It may extend over the ankles and up the leg like a sock, or halfway up the arms. Patches may show a yellow or a silvery pigmentation. One or both sides may be involved. If both, one is more affected than the other. Diagnosis has to be made from symptomatic keratoderma, from syphilis and from yaws and can usually be made by noticing the presence of the widespread dyschromias characteristic of mal del pinto.

The author believes that in Cuba late yaws and syphilis lesions are included under the name Pinta though careful examination should enable one to make the distinction. H H S

LEÓN (Luis A.) El mal del pinto en el Ecuador [Pinta in Ecuador.]—*Rev Med Trop y Parasit Habana*. 1940 Sept.-Dec Vol. 6 Nos. 5 & 6. pp. 253-276 With 7 figs. Also in *Acta Med Rio de Janeiro*. 1941 July Vol. 8. No 1 pp 3-27 With 7 figs. on 4 plates. English summary (3 lines)

RAMIREZ (E.) & RIVERO (M. D.) Estudio comparativo de las reacciones de Wassermann, Kahn y Proské en enfermos de mal del pinto. [The Wassermann, Kahn and Proské Reactions in Pinta.]—*Rev Inst de Salubridad y Enfermedad Trop Mexico* 1940. Dec. Vol. 1 No 4 pp. 311-318.

The Wassermann and Kahn reactions are matters of general knowledge, the Proské tyrosin reaction is less well known and calls for description. The materials used are—

1 A solution of sodium sulphate 14 per cent. Seventy gm. of the anhydrous salt are dissolved in 500 cc of freshly distilled water and made up to 500 cc at 37°C. This is kept in a thermostat at 37°C.

2 Solution 5% NaOH

3 Tyrosin solution made by dissolving 200 mgm. of pure tyrosin in 100 cc of decinormal HCl

4 Folm-Coralteau's reagent. In a 1,000 cc receptacle is placed 100 gm of sodium molybdate 700 cc of water 50 cc of 85 per cent phosphoric acid and 100 cc of concentrated HCl. Allow to stand for 10 hours then add 1500 gm CuSO_4 50 cc water and a few drops of bromine. Boil for 15 minutes to drive off excess of bromine. Cool make up to 1,000 cc and filter. There should be no green coloration.

Method. In a test tube are placed 3 cc of No 1 then 0.1 cc of blood serum (carefully measured) invert the tube 10-12 times, avoiding frothing and place at 37°C for three hours. Centrifuge at 1,500 r.p.m. for 10 minutes decant the supernatant fluid wash the precipitate with No 1 and centrifuge twice to remove all traces of albumen and pseudoglobulin. Add 1.75 cc water and 0.1 cc of No 2. Place in water bath kept at boiling point for 10 minutes, cool and add 0.15 cc of No 4. Shake gently and within 10 minutes read off the colour using the Pulfrich photometer and compare it as found in each serum tested with the absorption curves plotted with standard tyrosin solutions. This curve is made by placing 2 cc of solution No 3 in a 20 cc graduated tube adding 5 cc water and 1 cc of No 2, warm in a boiling water-bath for 10 minutes, cool and add 1.5 cc of No 4 shake up to 20 cc with water. A series is put up as follows with increasing amounts of water and diminishing of standard solution—

Tube	1	2	3	4	5	6	7	8	9	10
Water	0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
Standard solution	7	1.8	1.6	1.4	1.2	1.0	0.8	0.6	0.4	0.2
Tyrosin index	100	90	80	70	60	50	40	30	20	10

The results in 100 cases are given in a series of three tables and may be summed up thus—

- 1 Patients with W.R. and Kahn negative but showing initial lesions of pinta have an average tyrosin index of 97.7 with minimum 60 and maximum 148 (3 cases)
- 2 Those with W.R. negative but Kahn + to ++ and showing "plantitis" give an average of 69 and limits of 36 and 118 (9 cases)
- 3 Those with classical pinta (leucomelelodermitis) with W.R. negative Kahn positive have an average of 139 and limits of 53 and 240 (17 cases)

4 Those with W R. weak or moderately positive Kahn distinctly positive have average 105 with limits of 60 and 189 (10 cases)
 5 Those with pntids and W R. and Kahn both positive have an average of 155.6 with limits of 73 and 368

[The minima and maxima in these groups seem widely separated] The author concludes that the earliest serum reaction to appear in this disease is that of Kahn the Wassermann comes later but in the florid state both are positive As soon as the Kahn shows positive the tyrosin euglobulin index tends to mount and it increases as the other reactions become frankly positive but the tyrosin index is no guide to *s.c.* does not run parallel with the extent of the maculae nor has the total serum albumen any relation to the three reactions H H S

LEÓN Y BLANCO (Francisco) Las reacciones de Bordet Wassermann y de Kahn en el periodo secundario del mal del pinto [Wassermann and Kahn Reactions in Pinta Patients]—*Rev Med Trop y Parasit* Habana. 1940 July-Aug Vol 6 No 4 pp 201-205 [10 refs.]

Serological tests have been carried out with the blood of 107 patients in the second stage that of generalized or widespread dissemination of mal del pinto In all 107 the Kahn test was made and in 94 the Wassermann Of the former 95 were positive and 12 negative or 88.7 and 11.2 per cent respectively Of the latter 81 were positive (86.1 per cent) and 13 (13.8) negative In six cases the W R. was negative though the Kahn gave a positive and in some of those giving positive to both that to the Kahn was the more definite and intense the intensity of reaction was variable in general it was more marked the more advanced the condition but this did not always hold good.

ESCOBAR (J J) Blue Dermatitis of People of Chillos Plateau.—*Rev de Higiene* Bogotá. 1940 May-June Vol. 21 p 38 [Summarized in *Jl Amer Med Assoc* 1941 July 19 Vol. 117 No 3 p 231] H H S

Escobar describes a new type of chronic dermatosis among people who lived in the Colombian Chillos Plateau for a long time The prominent lesions are squamous dermatitis on areas of dark blue pigmentation of the skin alternating with areas of achromia and dyschromia exfoliation and ulcerations of mucous membranes especially those of lips and lids Areas of normal pigmentation such as those of the areola of the nipple and of the scrotum are not involved The bare parts of the body are more frequently involved than the protected parts The sensitivity of the skin is well preserved. The lesions are not pruriginous The morphologic blood picture is normal for persons of that region The incidence is the same for peoples of different race and sex. Alopecia and general adenopathy are commonly present The removed ganglions contain fine grains of pigment Serologic tests for syphilis give strongly positive results in all cases The patients however have neither a history nor clinical symptoms of syphilis The ulcers can be isolated from the skin, lesions ulcers and ganglions. It is a new species of *Spirochaeta* different from *Spirochaeta pallida* and *Spirochaeta carateum* Administration of two doses of 0.3 and 0.4 Gm

of arsenphenamine respectively results in disappearance of the epithetes and cure of the lesions. The disease must be differentiated from vitiligo leprosy syphilis and carcinoma

SILVA (Flaviano). Contribuição ao estudo do purú purú. [Contribution to the Study of Purú Purú].—*Brasil Medico* 1940 June 22. Vol. 64 No 25 pp 425-433 With 6 figs

Purú-purú is closely allied to if not identical with pinta [it must not be confused with purru a synonym of yaws in Malaya] Purú-purú (or curú-curú) is common among the natives of the Amazon and is characterized by patches ash-coloured or more darkly pigmented and in other parts achromic like vitiligo. It has many synonyms—pityriasis nigra in Peru quernea in Panama and Honduras.

Bolivia, cara in Peru quercia in Panama and Honduras. In the early stages the parts affected are flat or slightly raised, scaly and itching later they become in parts at least depigmented starting from the centre and itching ceases. Occasionally the patches are hyperchromic from the start. Pathologically the stratum corneum is thickened, the melanin pigment layer increased, the walls of the papillary and subpapillary vessels thickened and there is marked infiltration with lymph and plasma-cells. The palms and soles show much hyperkeratosis.

The disease rarely affects white people unless they are living with the Indians. All ages are affected but rarely any under 4-5 years of age. The author describes two cases, one in girl of 15 and one in a man of 50 years. He discusses the causation under the heads of deficiency disease mycotic infection (some authorities ascribe it to an aspergillus) sporochæte (*Sp. kerriensis* as in pinta) because the W.R. is positive in these patients but reaches no very definite conclusions. Next he considers the question of diagnosis discussing its differentiation from vitiligo leprosy syphilis yaws pityriasis versicolor tinea alba and tinea nigra tokelau or tinea imbricata, chumbe (an epidemic mononycosis of Bolivia). Treatment of various kinds has been recommended iodine salicylic acid, yellow oxide of mercury chrysarol and the like as parasitocides or fungicides but MATTA of Manaus states that arsenobenzol is the best and claims to have obtained cures many years from its use. H H :

LEVIN (Oscar L.) & BEHRMAN (Howard T). Coral Dermatitis.—*Arch Dermatol & Syph* 1941 Oct Vol 44 No 4 pp 800-803 With 1 fig [Summary appears also in *Bulletin of Hygiene*]

Direct injuries from coral fragments and those due to stinging coral animals must be distinguished. Cuts of the skin from coral have often been noticed to cause very indolent lesions and the delay in healing has been attributed to the constant contact with salt water. A mere scratch, if ignored, may in a few days become an ulcer with a sloughing base and red surrounding skin and even if the scratch is immediately washed with saline solution and painted with Tr. iod. a tender red indurated area may persist for a week or longer.

Injury may however follow mere contact and is then due to one of the Anthozoa, a coral polyp or sea-anemone. The Actinia genus has

lasso cells tubular cells which evert themselves and end in a harpoon like structure. A mollusc or crab falling on the flower is at once poisoned by the lassos and unable to offer resistance.

The case is reported of a man of 43 years in the West Indies who diving for coral picked up a piece and felt a stinging of the forearm. Within a very few minutes watery beads appeared from clear fluid oozing from the skin which itself became red oedematous and itchy. In less than 24 hours a slough was discharged leaving an ulcer two inches in diameter which did not heal for several months and left a thick scar. The same coral *Madapora palmata* can be broken by the hand without harm because so it seems the palmar epidermis is too thick for penetration of the stinging cell.

It is to be noted that this form of dermatitis is primary and not preceded by a break in the skin. H H S

MALARIA

PUBLIC HEALTH REPORTS. 1940 Oct 4 Vol. 55 No 40 pp 1801-1809 —A Brief Review of Needed Research in Malaria.

This is a short report by a group of United States malariologists who met to consider some fundamental aspects of malaria research. It is particularly concerned with the large and important gaps in present knowledge of malaria, and with suggestions as to constructive efforts that might help to fill in those gaps. Suggested lines of investigation concern chemotherapy, the biology and physiology of the parasite, immunological studies and the bionomics and ecology of anophelines. There is a compelling necessity for increasing knowledge of the prophylaxis and treatment of malaria as well as the control of anopheline production. Norman White.

BOCALANDRO (Carlos A.) & WILDE (Hugo J.) La lucha contra el paludismo. Acción de la Cruz Roja. (Antimalaria Campaign. Role of the Red Cross.)—*Rev Sanidad Militar* Buenos Aires 1941 Jan Vol. 40 No 1 pp 21-26.

This paper describes in general terms the distribution of malaria in the Argentine. The disease is endemic in the northern part of the country over an area of some 120 000 square kilometres inhabited by 850 000 people. The most important if not the sole, vector is *A. pseudopunctipennis*. Other anophelines for example *A. argyritarsis* are found in greater abundance but man has but little attraction for this latter species, which is very rarely found in human habitations. After a description of antimalaria measures in general the authors reach the conclusion that very few of them are practicable in existing conditions. N W

GARCIA (Enaebto Y.) A *Plasmodium* ovals-like Parasite in the Blood of a Native Filipino—*Acta Med Philippina* 1941 Jan-Mar Vol. 2 No 3 pp 341-349 With 2 plates (1 coloured) [11 refs.]

The paper gives a description of a malarial parasite of the *Plasmodium ovals* type, which was discovered in the blood of an eleven-year old Filipino in Manila. The parasite showed all the main features of *P. ovals*—tendency to oval form, fimbriation of margin of the red blood corpuscle, Schuffner's dots and their early appearance after infection of the corpuscle, failure of corpuscle to enlarge, and merozoite number of 8 to 12. The discovery of the parasite in Manila is of interest in the light of CRAIG's description of a similar form in 1900 in the U.S.A. in the blood of an American soldier returned from service in the Philippines. Craig later identified his parasite with one described by EMM in 1914 as *P. viox* var. *minuta* and with the form named *P. ovals* by STEPHENS in 1922. It seems probable that all three forms are actually *P. ovals* and that the author has re-discovered the parasite in the Philippines after a lapse of 40 years. The paper is illustrated by a plate of microphotographs and another of coloured drawings of the parasite.

C. M. Wenyon

KHODURIN (N.) & SHTENGOL D. (E.) On the Resistance to Cold of Some *Anopheles*—*Acta Univ. Asiae Med. Tashkent* 1938 (8 Zool.) No 45 11 pp With 3 graphs [In Russian. English summary.] [Summarized in *Rev. Applied Entom.* Ser. B 1941 Sept. Vol. 29 Pt 9 p 141]

"Laboratory investigations were carried out in Tashkent on the resistance to cold of females of *Anopheles maculipennis* var. *sacharovi* Favr., *A. superpictus* Grassi, and *A. pulcherrimus* Theob. The experimental technique is described, and the results are shown in tables. Previous work in Russia has shown that cold resistance in insects depends on the amount of fat present in the body, the degree of nutrition and the quantity of fluid in the body that freezes. The last of these factors is largely dependent on the first two. The temperature at which the fluid freezes cannot be taken as an accurate index of cold-resistance since it is dependent on all three factors. The authors' investigations showed that although females of both *superpictus* and *pulcherrimus* froze at -7.8°C (17.96°F) and the percentage of fluid in them that froze was almost the same (24.1 and 24.6 respectively), the percentages of fat in them were 73 and 35, and that although the percentages of fat in females of *sacharovi* and *superpictus* were of the same order (78 and 73), the temperatures at which the mosquitoes froze were 63.5 [-0.4°F] and -7.8°C , and the percentages of fluid that froze were 63.5 and 24.1 respectively. Two of 12 females of *sacharovi* with a developed fat-body survived exposure for 30 hours to a temperature of -20°C [-4°F] but all those of *superpictus* and *pulcherrimus* died after exposure for 17 and 20 hours to -9.5 and -7°C [14.9 and 19.4°F] respectively.

"In Tashkent, females of *A. m. sacharovi* usually hibernate in buildings in which the temperature does not fall below -7°C , and recent observations indicate that in inhabited localities those of *A. superpictus* usually select similar hibernation quarters. There is therefore

unlikely to be any mass mortality among these mosquitos in winter *A. pulcherrimus* does not hibernate in the adult stage.

In experiments in which eggs of *A. pulcherrimus*, *A. hyrcanus* Pall and *A. m. sacharovi* were kept for 16 hours at -4°C . [24°F] those of *sacharovi* did not hatch whereas those of the other two did so after 48 and 24 hours respectively. In the controls the eggs of these mosquitos hatched in 24, 24 and 32 hours respectively.

RUSSELL (Paul F.) & MOHAN (Badri Nath) An Insectary Colony of *A. stephensi mysorensis*—*Indian Med Gaz* 1941 Apr Vol. 76. No. 4 pp 219-220

In India there are two distinct types of *Anopheles stephensi* differing in egg measurements and several biological points. The type form is very easy to rear in cages for an indefinite number of generations var *mysorensis* has proved impossible to rear in cages.

The authors find that the difficulty in breeding var *mysorensis* does not arise (as it does in certain races of *A. maculipennis*) from inability to copulate in cages but from the female's failure to lay eggs. If the female is gently stunned and then thrown upon the surface of water she will generally lay eggs forthwith. P A Buxton

TOUMANOFF (C) Les Black Spores de Ross et la dégénérescence brune des microfilaires chez les moustiques: conception nouvelle sur leur nature et origine possibles. Considérations sur la chitinisisation défensive chez les insectes. [New Views on 'Black Spores' and "Brown Degenerescence" of Microfilaria in Mosquitoes.]—*Rev Méd Française d'Extrême-Orient* 1940 Apr-May No 4-5 pp 173-197 With 10 figs [28 refs]

The author reviews the various theories which have been advanced in explanation of the black spores which are encountered when mosquito dissections for possible malarial infections are carried out. He admits that they occur only in mosquitoes infected with malaria and that they are the result of changes which take place within the oöcyst. These changes may occur before sporozoites have been formed, when the dark bodies will be rounded structures, or after sporozoites have developed when they are banana shaped. In either case he disagrees with the view that the dark substance is chitin. He considers rather that it is melanin or a complex of this substance and chromolipoid which results from the oxidation of protein degradation substances (polypeptides to tyrosin) by tyrosinase and the auto-oxidation of lipoids during the course of degenerative changes within the oöcyst. In support of this oxidation hypothesis is the observation of Bruce MAYNE that oöcysts containing black spores are always closely associated with a branch of the mosquito's tracheal system. A similar explanation is advanced for the brown pigment which forms around degenerating filariae in the organs of mosquitoes. It has been supposed, as in the case of black spores, that this pigment is chitin but the author finds that there is no evidence of this. Furthermore he expresses the opinion that the so-called chitinous deposits by which insects in general are able to protect themselves against invading organisms are not of this nature but are again as in the case of black spores merely pigments resulting from the oxidation of degenerating

proteids and have no relation to protective mechanisms which in insects are represented by the accumulation of phagocytes at the sites of invasion.

C M IV

OU (Tenshun) Zum Studium ueber die Funktion der Retikuloendothelialsystems bei Malaria [The Function of the Reticulo-Endothelial System in Malaria].—*Taiwan Igakkaï Zasshi* (Jl Med Assoc Formosa) 1941 Apr Vol 40 No 4 [In Japanese pp 770-775 [13 refs.] German summary p 776]

After the removal of 5 cc. of blood from the vein of one arm 10 cc. of a 1 per cent solution of Congo Red are injected into the same vein. Three minutes and one hour later 5 cc. of blood are taken from the other arm. The sera are separated and photometer readings are taken the reading from the first blood (taken before the injection) acting as control. the concentration of the dye in the 60-minute specimen compared with that in the 3-minute specimen is a measure of the capacity of the reticulo-endothelial system to take up the dye. The normal index is regarded as between 60 and 73 per cent. in 10 cases of acute malaria the index was from 62.3 to 87.4 per cent. and in 10 cases of chronic malaria was from 58.5 to 85.8 per cent. After treatment the index tends to become normal.

C IV

COOPERHALL (L. T.) The Complement Fixation Reaction as a Diagnostic Aid in Malaria.—Reprinted from *Proc Indian Acad Sci* 1941 Vol 50 pp 53-55

The need for improved methods in diagnosis, especially in chronic malaria is self-evident. So far complement-fixation has met with little success, the chief difficulty being lack of a satisfactory source of malaria parasites as an antigen.

A malarial infection (*P. knowlesi*) which is so highly virulent for cynomolgus monkeys, furnishes abundant quantities of antigen which binds the complement in the serum of chronic *vivax* or *falciparum* malaria [see this *Bulletin* 1939 Vol 36 p 405].

The antigen was prepared from parasitized red cells obtained from rhesus monkeys after infection with *P. knowlesi* which produced an overwhelming infection with 80 per cent of red cells parasitized. The red cells were then washed free from serum and preserved by freezing and drying in 5 cc. amounts. The stored antigen was rehydrated and diluted 1:100 in normal saline which is well beyond the anti-complementary range and is highly antigenic. Tests were then set up as for the Wassermann reaction. It was found that serum of patients with *vivax* and *falciparum* malaria would fix complement with the monkey parasite antigen in approximately the same dilutions as serum from patients with *P. knowlesi* malaria (used in the treatment of general paresis).

The antigen is capable of reacting with heterologous as well as with homologous malaria sera. Sera with positive Wassermann reaction were negative in the absence of malaria, and positive only when malaria infection was present. Control sera from patients with other infectious diseases, and from animals with trypanosomiasis and piroplasmosis gave negative tests. The usefulness of this test in diagnosis depends on its being positive when it is not possible to detect parasites in stained thick or thin blood smears.

Serum was obtained from 12 patients with general paresis inoculated with *P. vivax*. They were then bled at 10-day intervals and blood was examined for parasites. When the parasites could no longer be found serum was obtained until the complement-fixation test became negative. Complement fixing antibodies appeared in the serum before the peak of the malarial infection or about two weeks after the onset of clinical symptoms and persisted for five months after the disappearance of circulating parasites. More practical tests with naturally acquired malaria in the field are obviously indicated. *P. Manson Bahr*

DULANEY (Anna Dean) STRATMAN THOMAS (Walter K.) & WARR (Otis S.) Complement Fixation in Malaria with Special Reference to the Diagnosis of Naturally Acquired Infections.—*Jl Bacteriology* 1941 Jan. Vol. 41 No 1 p 66

Earlier studies of complement fixation in induced malaria indicated that this reaction might be successfully used in the diagnosis of naturally acquired infections. Accordingly, 311 patients whose histories and symptoms suggested malaria were tested and the results of complement fixation compared with blood-smear findings. For all of the tests we used the concentrated *Plasmodium knowlesi* antigen previously described.

Of the 311 patients 117 had positive blood smears and 90 gave positive complement-fixation tests. Twenty-eight of the 90 had received some antimalarial drug. Of this group 76 were infected with *Plasmodium vivax* and 14 with *Plasmodium falciparum*. Twenty-seven patients with positive blood smears (18 were *Plasmodium vivax* 9 *Plasmodium falciparum*) gave negative complement fixation tests. Of this group 17 had received antimalarial drugs. No parasites were found in blood smears from 194 of the 311 patients. Negative complement-fixation tests were given by 173. Of these eight had had parasites in the blood, but had completed treatment. Twenty-one of the 194 gave positive complement fixation tests. Five had received treatment. As controls the sera from 267 patients with bacterial or protozoan infections and 91 presumably normal individuals were tested. Thirty-one positive complement fixation tests were obtained.

Approximately 80 per cent of the patients with naturally acquired malaria yielded positive complement fixation tests at a time when parasites were present in the blood. A negative test did not exclude malaria, for parasites were demonstrated in blood smears at such a time. The complement-fixation reaction remained positive for 2 months or longer after the disappearance of parasites from the blood.

EAGLE (Harry) MAYS (J. R. S.) HOGAN (R. B.) & BURNEY (L. E.) The Reactivity of the Serum of Malarial Patients with Spirochetal Suspensions.—*Amer Jl Syph* 1941 July Vol. 25 No 4 pp 406-411

Malarial infections may yield positive Wassermann and flocculation tests in the absence of syphilitic infection. A complement fixation test using cultured spirochaetes as antigen is a specific and sensitive test for syphilis. Observations here described were carried out to determine whether the spirochaete complement fixation test could serve to differentiate syphilitic from malarial infections.

Eleven patients who presented no clinical or serological evidence of syphilitic infection were inoculated with tertian malaria. At irregular intervals before and after inoculation blood specimens were collected. Six uninoculated patients three syphilitic and three normal served as controls. Each serum was tested with a complement fixation test using a washed suspension of cultured spirochaetes (Reiter and Hazan strain) as antigen with an Eagle micro-flocculation test and a Wassermann test (Eagle modification). Most of the positively reacting sera were titred. The spirochaetal complement fixation test actually gave a larger proportion of positive and doubtful reactions in the malarial patients than did either the malaria inoculations the Wassermann test was positive in 7 and doubtful in 5 the flocculation test was positive in 11 and doubtful in 6 the spirochaetal complement fixation test was positive in 11 and doubtful in 6. The spirochaetal complement fixation test does not permit the serological differentiation of syphilis and malaria. It may be that the serologically active substances which appear during malaria infections cross-react with cultured spirochaetes more strongly than they do with tissue lipoids. N H

Asai (Masaki) Zum Studium der Serodiagnostik der Malaria. II. Mitt. Ueber die Kongorot Flokkulation nach Oda Asai. (Serological Diagnosis of Malaria Congo Red Flocculation the Oda-Asai Test.)—*Tamkoku Igakkaï Zasshi* (Jl. Med Assoc Formosa) 1941 Jan Vol 40 No 1 [In Japanese pp 45-54 With 2 charts (10 rels.) German summary pp 55-58]

It is known that colloidal dyes such as Congo red, flocculate in solutions of salts, such as quinine hydrochloride of certain strengths, and that this flocculation is inhibited in the presence of albumin and increased in the presence of globulin. To 5 cc of a mixture of 0.1 per cent. Congo red solution (5 cc) and 0.5 cc serum to be tested, are added 5 cc of 0.3 per cent solution of quinine hydrochloride. This is well shaken. After 1-2 hours at room temperature the mixture is centrifuged and the supernatant fluid is compared in a colorimeter (Authehnmeth) with a four times diluted 0.1 per cent Congo red solution. The stronger the flocculation the more transparent the fluid, and the more can the colorimeter scale be read. The test becomes positive within 4 days of infection. It was positive in 19 of 21 acute cases with a mean scale value of 60.8, in 19 of 24 latent cases value 82.4 in 49 of 54 chronic cases value 68.4. After treatment the proportion of positives falls but the scale values rise. Positive results are also given in tuberculous kala azar liver disease, syphilis, typhoid and pneumonia. C W

BARDHAM (P N) Effect of Administration of Quinine on the Finding of Malarial Parasites in the Peripheral Blood.—*Calcutta Med Jl* 1941 Mar Vol 38 No 3 PP 125-128. With 1 chart.

Two cases are reported in which malarial parasites (*P. vivax* in the one and *P. falciparum* in the other) were found after the patients had taken 120 grains and 20 grains of quinine respectively. The first patient was a British soldier whose rise of temperature was continuous for the first few days, without demonstrable parasites in the blood. This fever is ascribed by the author to coryza [but is quite

characteristic of a primary malarial infection] The second patient was a child parasites were found for nine days during which 70 grains of quinine were given
C IV

TANAKA (Shigeo) Ueber die klinischen Befunde und die Nachkur bei den Malaria Bestandenen unter den Marinern [Clinical Findings after Treatment in Malaria]—*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1941 Jan Vol. 40 No 1 [In Japanese pp 13-37 [33 refs.] German summary pp 37-38]

The author observed the results of quinine treatment in 79 sailors. The Henry reaction was positive in 50 per cent within two months of cure but after that in only 13 per cent. Anaemia cleared up usually within a month the sedimentation rate was normal in about three months. In 9 per cent basophil cells were seen in the blood. Urobilin was found in the urine in 6 cases sugar in 6 and albumin in one (but at what period is not stated). In the group in which infection was due to *P. falciparum* were found—one case with leucopenia 3 with microcytosis and anisocytosis 2 with excess of plasma cells and 5 with urobilinuria
C IV

NAPIER (L. Everard) & CHAUDHURI (R. N.) A Note on the Treatment of Relapsing Malaria.—*Indian Med Gaz* 1941 June Vol. 76 No 6 pp 335-336

The authors report a case of benign tertian malaria with enlargement of the spleen in which relapses had persistently occurred in spite of treatment with quinine atabrin and plasmoquine. The patient a European was therefore treated by them as follows—sod. bicarb gr 15 and sod cit gr 30 were given followed half an hour later by 10 grains of quinine three times a day. Plasmoquine 0.01 gm twice a day was given concurrently. This was continued for 10 days. On the 11th and 18th days he was given intramuscular injections of 18 and 24 cgm. sulpharsenol respectively and from the 11th day a tonic mixture containing liq arsenicalis in 4 twice each day. Thereafter he was given a second course of quinine for one week, followed by 30 cgm. sulpharsenol. He remained free of fever for more than six months and gained about 20 lb in weight.

The points to be noted are the use of quinine with alkali as advised by SINTON the addition of plasmoquine and the use of an arsphenamine preparation (a common practice in the Balkans). These measures are more effective than prolonged use or injection of quinine.
C IV

WINCKEL (C. W. F.) Neosarsphenamine to manage Course of Fever in Therapeutic Malaria.—*Jl Amer Med Assoc* 1941 June 14 Vol. 116 No 24 pp 2660-2663 With 5 charts

In the Netherlands neosarsphenamine is used with great success to control the fever in therapeutic malaria. The drug is effective only in *P. vivax* infections. Since 1933 a Madagascar strain of *P. vivax* has been used. local Dutch strains were employed before that date. Infection is conveyed either by the inoculation of infected blood or by mosquito bite. *P. malarias* is also used in therapeutic malaria. Neosarsphenamine has 'no' effect on the fever caused by *P. malarias* infections.

HUFF (Clay G) Comparisons of a Clon of *Plasmodium cathemerium* with its Parent Strain and with Two Strains derived from the Clon by Mosquito Transmission.—*Jl. Infect. Dis.* 1941 Mar-Apr Vol. 68 No 2 pp 184-187

From a strain of *Plasmodium cathemerium* in canaries a clon was produced by isolation of a single parasite. From this clon two other clons were obtained by mosquito transmission after the 25th and 30th passages. The parent strain and the three clons were studied from the points of view of the size and variability of the oöcysts and the infectivity to mosquitoes. The production of the clon by isolation of a single parasite reduced the variability of the oöcysts but this variability was not restored by the two mosquito transmissions. The three clons, as regards average size of oöcysts or number of oöcysts per mosquito did not differ from the parent strain. One of the strains through direct passage from bird to bird had lost very largely its power to produce gametocytes. That some were present was proved by infections developed in mosquitoes. The power to produce gametocytes in large number was restored by mosquito transmission. A clon or clone is defined as a group of individuals of like hereditary constitution, traceable through asexual reproduction to a single ancestral zygote C M II

HEGNER (Robert) WEST (Evaline) RAY (Mary) & DOBLER (Marian) A New Drug Effective against Bird Malaria.—*Amer. Jl Hyg.* 1941 May Vol 33 No 3 Sect C pp 101-111 With 9 figs.

During the course of investigations directed to the discovery of a drug more effective than quinine hydrochloride in the treatment of malaria in birds it was found that the quinine derivative hydroxyethyl apocrepine was equal in action to quinine hydrochloride on three species of bird malarial parasite. It had moreover the advantage of being less toxic so that considerably larger doses could be given. The authors express the view that as malarial parasites of birds react to drugs similarly to those of man it would seem probable that the derivative under discussion will prove to be effective against human malaria C M II

RELAPSING FEVER RAT BITE FEVER LEPTOSPIROSIS

CHEN (Kuo-chung) Growth of Louso-Borne Relapsing Fever Spirochetes in Chick Embryo.—*Proc Soc Experim Biol. & Med.* 1941 Apr Vol 46 No 4 pp 633-639

"It is well known that important biological differences exist between the tick-borne and louse-borne relapsing fever spirochetes. With the former infection can readily be produced in a large variety of laboratory animals which together with the tick, serve as means of keeping the strain in the laboratory. On the other hand, few animals were found to be susceptible to the louse-borne type and the louse cannot be used to maintain the spirochetes."

In this preliminary contribution it is stated that blood was taken from seven patients with louse-borne relapsing fever in Peiping and inoculated into the yolk sac or beneath the chorio-allantoid membrane of hens eggs the shells were then sealed. Good growth of spirochaetes was seen in the blood of the embryos rising to a maximum on the fifth day. The number of organisms was greatly increased after three passages. Growth depends on the living embryo the spirochaetes soon disappearing after death has occurred. C 17

DAVIS (Gordon E.) *Ornithodoros turicata* the Male, Feeding and Copulation Habits, Fertility Span of Life, and the Transmission of Relapsing Fever Spirochetes.—*Public Health Rep* 1941 Sept 5 Vol 56 No 36 pp 1799-1802.

1 Twelve male *O. turicata* were observed for feeding and copulation habits the transmission of relapsing fever spirochaetes span of life and for fertility as old males in comparison with young males.

2 Based on 100 observations, time for complete engorgement varied from 6 to 23 minutes.

3 Based on 100 observations the time required to complete the act of mating varied from 12 to 60 minutes with the majority falling between 21 and 35 minutes.

4 The male may transmit spirochetes at each feeding throughout life it may transmit them irregularly or after several successive transmissions it may fail to effect further transmissions.

5 A comparison of the fertility of virgin males and old males suggests that mating of the latter results in a larger proportion of fertile eggs.

6 Test feedings of 6 females (a total of 22 feedings) after each mating with spirochete-carrying males and 1,229 test feedings of the progeny of these matings failed to infect white mice.

7 The span of adult male life under laboratory conditions varied from 15 to over 36 months.

HAWKING (Frank) Relapsing Fever Cerebrospinal Fluid and Therapy.—*Jl. Trop. Med. & Hyg.* 1941 Aug 15 Vol. 44 No 16 pp 104-105.

The author has examined the cerebrospinal fluid of 12 cases of East African relapsing fever (*S. duttoni*) at Kahama in the Central Province of Tanganyika in which region the disease is endemic and the native huts swarm with *Ornithodoros moribundus*. In each case lumbar puncture was performed and the search for spirochaetes made by injecting 0.5 to 1 cc. of c.s.f. intraperitoneally into each of two mice. Parasites were never found by direct examination but 5 out of the 12 fluids produced infection in mice. Three of the patients showed clinical and pathological signs of meningitis but in the other two there was no evidence that the meninges were specifically affected.

The results of treatment are difficult to evaluate but Arsant (a compound of the Salvarsan type in which one of the two arsenic atoms is replaced by antimony) was found to have about the same therapeutic potency as neoarsphenamine and Bayer 205 was found to be ineffective. E. Hindle

CHEM (Y. P.) & ANDERSON (Hamilton H.) Course and Chemotherapy of Experimental Relapsing Fever in the Chinese Hamster (*Cricetus griseus*).—*Proc Soc Experim Biol & Med* 1941 Apr Vol. 46 No 4 pp 658-662. With 1 fig [12 refs.]

The authors find that the Chinese hamster *Cricetus griseus* is very susceptible to infection with a Californian strain of spirochaete transmitted by *Ornithodoros korosi* Wheeler [See this Bulletin 1939 Vol. 38 p 758]

In 53 hamsters inoculated intraperitoneally with spirochaetes from infected hamsters the incubation period varied from 24 to 72 hours, and three relapses usually occurred. More than half died in nine to 30 days, generally after two weeks. When blood from infected mice was used the spirochaetes appeared in 24 to 48 hours and there were three or four attacks each of four to six days duration with intervals usually of 24 hours. Although the infections were longer fatalities were less frequent but about one fifth died in 12 to 37 days. Brains of untreated animals removed eight to ten days after the blood was negative, showed spirochaetes in sections stained by Steiner's method.

A study of the chemotherapy of this strain of relapsing fever in Chinese hamsters was attempted using neoursphenamine and a less toxic arsenical known as Trisodarsen the tri-sodium salt of 4,4¹ dihydroxy-arsenobenzene-N,N¹ dimethylene sulphonie acid. Thirty hamsters were infected with mouse blood and 30 with blood from other hamsters. Half of each group was then treated with one drug and half with the other using in each case $\frac{1}{2}$ of LD₅₀ (the dose which kills 50 per cent of the test animals). Of those infected with mouse blood, seven out of 15 treated with neoursphenamine were still positive 48 hours after the second injection and $\frac{1}{2}$ of the LD₅₀ dose had to be given before all the animals had negative blood smears. Four developed residual infections and two out of 15 died. Of those infected with hamster blood, all appeared negative 48 hours after the second infection, but five showed residual infections, and three out of the 15 died within nine days.

Hamsters infected with mouse blood responded promptly to treatment with trisodarsen and all appeared negative within 48 hours of the second injection, but there were three residual infections and two out of the 15 animals died. Hamsters infected with hamster blood also all became negative after the second injection, and none of them showed any residual infection. Two of the 15 died within 19 days.

Eight out of 15 untreated hamsters showed residual infections. It would seem, therefore that both drugs possess well marked spirochaeicidal properties, trisodarsen giving rather more satisfactory results than neoursphenamine.

E H

IKARI (Nobutaro) SHIMIZU (Shigeo) & TSUDA (Kyonuke) The Effect of Sulfapyridine on Experimental Spirochaetosis Recurranth.—*Japanese Jl Experim Med* 1941 Feb-June Vol 19 Nos. 1-3. pp 5-9

"1 The experimental investigations on the therapeutic value for spirochaetae (*Treponema duttoni*) of several medicaments such as Sulfapyridine, Sulfamethyl thiazol, Prontosil album, Dneptal A, and Sulfanilamide were carried out. And it was proved that Sulfapyridine possessed an effective power against spirochaetae.

2. The therapeutic value of Sulfapyridine on spirochaetae was compared with that of Osvarsan (arsenic compound). The former showed a sufficiently effective power in a dose of 0.01 g (1/100) while the latter in a dose of 0.002 g (1/500). Consequently the therapeutic value of Osvarsan was five times as much as that of Sulfapyridine.

3. The dose of Sulfapyridine for a patient is usually 3.0-5.0 g and that of Osvarsan 0.75 g; therefore the dose of the former is 4-6.6 times as much as that of the latter. It is clear that the same therapeutic results for spirochaetae may be practically obtained by these two medicaments.

HUART Rattenbeetziekte [Rat-Bite Fever] [Verslagen der Afdeling vergaderingen Military Hospital Batavia 1940 Dec. 19]—*Geneesk Tijdschr v Nederl-Indië* 1941 Apr 22 Vol 81 No 16 pp 900-903

The patient was a soldier of Amboina who came to hospital with fever 39.8°C, diarrhoea, enlarged spleen, a tongue furred with red edge, short of breath and cyanotic. A preliminary diagnosis of typhoid fever was made, but repeated trials of agglutination tests with the enteric group and also *Brucella* and *Leptospirae* gave uniformly negative results. It was then found that a month before he had been bitten on his right middle finger by a rat. There still remained a slight purple red stain and perhaps a little swelling and an axillary gland was enlarged. Improvement was rapid and complete after an injection of 300 mgm. of neosalvarsan. H H S

GREENGARD (Joseph) & HESS (Edmond R.) Rat-Bite Fever in an Infant Bitten at the Age of Eleven Days—*Jl Amer Med Assoc* 1941 May 24 Vol 116 No 21 pp 2393-2394

The description of a typical and fatal case of rat-bite fever in an infant negress aged 11 days. The patient was brought to hospital about two hours after having been bitten in the hand by a rat. The wound healed quickly, but after an incubation period of 12 days symptoms of rat bite fever developed and the infant died one month later. An intercurrent infection of the respiratory tract developed two weeks after the onset of rat bite fever. The specific organism was recovered by inoculation into mice of blood collected from the patient during the first febrile attack.

The authors give clinical details of the case which seems to be the youngest hitherto reported. E H

STEFANOPOULO (G J) & CHEVÉ (J) Culture de *Leptospira icterohaemorrhagiae* en tissus embryonnaires de poulet [The Culture of *Leptospira icterohaemorrhagiae* in Fowl Embryonic Tissue]—*Bull Soc Path Exot* 1940 Vol 34 Nos. 1-3 pp 15-17 With 1 fig

The authors confirm the observation by MORROW, SYVERTON, STILES and BERRY [see this *Bulletin* 1939 Vol 36 p 772] that *L. icterohaemorrhagiae* can be grown on the chorio-allantoic membrane of the fowl embryo and reproduce a microphotograph of a section of the liver of an infected embryo showing the very large number of spirochaetes present in this organ.

Attempts were made to culture the organism *in vitro* in a medium containing embryonic tissue and the following method was found to give the best results —

In each sterile test tube is run in 10 cc. of a filtered extract of clotted horse blood and 0.2 cc. of a suspension of the brain of a 12 to 15-day fowl embryo. The medium is then covered with a layer of sterile oil or vaseline and incubated 24–48 hours in order to check sterility. The extract of clotted horse blood may be replaced by Tyrode solution and the brain by other tissues of the fowl embryo.

The medium will keep for at least one month if kept in the dark at room temperature. When required for use each tube is inoculated with the material to be tested and incubated at 29°C. for four to five days after which cultures can be kept at room temperature. The authors have obtained five successive passages without the agglutination properties of the strain showing any alteration. E. H.

SMITH (J.) The Treatment of Weil's Disease.—*Med. Press & Circular* 1941 July 23 Vol 206 No 4 pp 87–89 [14 refs.]

The author describes briefly the clinical features of the disease, making special reference to meningitis which was found to occur as a complication in 10 per cent. of a series of cases recently seen in Aberdeen. This meningitis is mild in character and appears to have little prognostic value. The age of the patient, however, is of great importance and the case mortality rate in those over 50 is immensely greater than in younger people. The absence of jaundice is a sign of good prognosis. During the febrile stage leptospirae can be found in the blood in almost every case but from the sixth or seventh day agglutinins and brains are found in rising titre and the organisms disappear. In the second and third weeks leptospirae may be recovered from the urine.

Treatment may be discussed under three headings: symptomatic treatment, chemotherapy and serum therapy. Symptomatic treatment consists of the administration of diaphoretics, a diet rich in carbohydrate and poor in protein and fat and plenty of fluid. Chemotherapy with bismuth preparations is effective in animals but has not been attempted in man: there is no evidence that the sulphonamides exert any beneficial effect. Serum (prepared in Britain against *L. icterohaemorrhagiae*) should be given early before damage has been done to the kidneys or liver. 30 to 60 cc. may be injected intramuscularly or intravenously and repeated if necessary. Little benefit may be expected from the administration of serum after the sixth day but when given at an early stage the effect is immediate. Serum may be used as a prophylactic agent in those who have been exposed to infection.

C. IV

TROPICAL DISEASES BULLETIN

Vol. 39]

1942.

[No 3

SUMMARY OF RECENT ABSTRACTS *

III MALARIA

Epidemiology

WIGGLESWORTH (p 500) discusses the general application of the principles of malaria investigation and control to war time conditions especially as they affect troops. The paper cannot be further abstracted but should be read by all those who have the medical care of groups of men in malarious countries

HACKETT (p 102) has discussed some of the obscure factors in the epidemiology of malaria which may upset calculations based on measurable factors and which demand further study. This paper should be read by all those engaged in malaria work.

HUTTON NAPIER and MANSON BAHR (p 333) and GARDNER (p 557) have all drawn attention to malaria on ships calling at West African ports and in persons landing in England from these ships. The infection is chiefly due to *P. falciparum* and is contracted principally at Freetown. It is emphasized that the disease should be borne in mind and that the use of atabrin as a prophylactic should be pressed.

KELKCHER (p 503) shows that in the Province of Moscow malaria parasites are most frequently found in man in June and are due to relapses or latency. June is the month during which *A. maculipennis* of the first generation emerge and new cases of malaria cannot occur until mid-July and cannot serve as sources of infection until August when most of the female mosquitoes have developed fat-bodies and are inactive. The chief sources of infection of mosquitoes are therefore latent cases and relapses.

KINGSBURY (p 102) records an autumn wave of malaria in the Federated Malay States in 1939 a feature which had not occurred for many years. There is usually a wave from April to June and in recent years the annual incidence has been relatively high probably owing to extensive replanting of rubber and the opportunities for anopheline breeding thus created.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

[March, 1942]

ROBERTSON (p. 103) reports that although malaria was apparently not common in Hunan, Central China, until recently it is now firmly entrenched there probably as a result of the movements of refugees and the passage of troops occasioned by the war with Japan. Of the parasites found in a small survey in the north-east, *P. malariae* was the most common further south *P. falciparum* was most in evidence. He (p. 501) states that on the China Burma road subtertian malaria is most prevalent in the low-lying plains but that at high altitudes benign tertian is most in evidence. Quartan is rare except in one town. WILLIAMS (p. 502) states that at the eastern end of the China Burma road malaria is not very prevalent, but at the western end is hyperendemic especially in the valleys between 2,000 and 5,000 feet. The highest rates were found at Chefang and here subtertian malaria accounted for 67 per cent of the cases.

GILL (p. 410) refers to the vital statistics of Ceylon in relation to the incidence of malaria upon natality. On the basis of spleen rates the island can be divided into five zones, and the death rates and infant mortality rates appear to reflect the baneful effects of malaria. Endemic and epidemic malaria have little influence on natality but increase the frequency of still-births. High degrees of immunity confer partial protection against these accidents of pregnancy.

CAPOV (p. 229) records an outbreak in Kahlan Tangi, Baluchistan at an altitude of 8,500 feet above sea level. GARDNER (p. 176) remarks that there is a good deal of quartan malaria at Kisumu, Kenya, particularly in children and that *Anopheles gambiae* is an efficient vector of this form. The disease is mild and patients rarely come for treatment, so that most of the cases seen in hospitals are subtertian. HAYES (p. 227) reports an epidemic of unusual severity in Nairobi, Kenya, during 1940 [it is not clear which was the prevalent type presumably subtertian]. BRAMBILLA (p. 708) states that malaria is only mildly endemic in Durré Dura, Abyssinia, and that in one survey 66 per cent of infections were due to *P. vivax* the remainder to *P. falciparum*. MORSE (p. 709) records a spleen rate of 41 and a parasite rate of 35 in children of Assab, Eritrea.

AMMALLEY (p. 104) reports a severe outbreak of malaria in R'Ordi, Algeria, a region in which transmission was almost non-existent in 1934-36. The observations illustrate the disastrous consequences of intense anophelism even when the local reservoir of malaria infection may appear to be negligibly small.

Malaria causes 2,500 to 4,500 deaths each year in the United States. In Georgia, BROWN (p. 409) points out that subtertian infection is probably more frequent than reports indicate. Most of the deaths occur in children and in adults over middle age. FAUST and PARKER (p. 173) discuss the cyclical incidence of malaria in the southern United States.

PIRROTTI (p. 408) states that only one of the 21 States of Brazil, Rio Grande do Sul, appears to be free from malaria. Elsewhere as a cause of death, malaria is only surpassed by tuberculosis and intestinal diseases.

Actiology

ROBERTS (p. 30) describes a malaria parasite which he considers to be a new species, and which had been noted first by D. Bagster WILSON. He names it *P. wilsoni* and points out that it has been found

in refugees from Abyssinia in natives of Tanganyika and in members of all races in East Africa during a recent epidemic. Clinically the infection is marked by strong tendency to relapse and by heavy blood infection. The parasite is small and resembles *P. ovale* the gametocytes are heavily pigmented and the red cells always greatly enlarged but stippling is frequently absent though a faint quartan type of stippling may be seen. The red cells are usually greatly enlarged. In comment WENYON points out the necessity for complete investigation of all stages of the life cycle in man and mosquito and for demonstration that the specific characters are constant after many passages before the decision that this is a valid new species can be made.

RAMAN (p. 290) claims to have found *P. ovale* in a patient infected in India.

STRATMAN THOMAS (p. 334) has investigated the influence of temperature on *P. vivax* in *A. quadrimaculatus*. The cycle of sporogony was completed in 8 days at 28°-30°C but took as long as 38 days at 15°-17°C. In mosquitoes maintained at 37.5°C infection acquired shortly before was abolished within 3 hours development of oöcysts and infectivity of sporozoites in the salivary glands were aborted or inhibited within 24 hours. On the other hand in mosquitoes maintained at 1°-10°C 2½ days were required for elimination of infection recently acquired, and 24 days for interruption of oöcyst development. It is therefore evident that although development of the parasite in the mosquito is more rapid in moderate warmth than in moderate cold, the parasite is more susceptible to greater heat than to greater cold. It was also found that adult *A. quadrimaculatus* can survive higher and lower temperatures than the forms of *P. vivax* it harbours.

FIELD and LE FLEMING (p. 501) have described the morphology of *P. malariae* in thick films and FIELD (p. 501) discusses the differential diagnosis of the three common species.

Transmission

Although *A. maculipennis* var. *atroparvus* from English sources can readily be infected with *P. vivax* and *P. ovale* and with *P. falciparum* from Italy and Rumania, SHUTE (p. 176) reports that he failed to infect it with strains of *P. falciparum* from Indian and African sources. He concludes that there is little chance of spread of subtertian fever of tropical origin from gametocyte carriers in Great Britain.

BATES (p. 558) discusses the nomenclature of members of the *A. maculipennis* group. He recognizes 7 types of eggs and states that it is often possible to distinguish between the larvae of the different races. He regards the differences between some of the races as of specific value, and gives a proposed classification of the group with information on geographical distribution. He (p. 502) gives details of his method of rearing *A. maculipennis* with particular reference to combinations of salts used in the water. As a routine he uses water containing grass sods, but in comment SHUTE points out that if the water is gently aerated for an hour or so each day the changing of water advocated by Bates is not necessary. Shute also states that sods should be collected some distance away from tarred roads and fences, and that the addition of organic foods to pans containing large sods is unnecessary.

In Sardinia PAMPANA and CASINI (p. 710) state that of the anophelines found, *A. claviger*, *A. algeriensis* and *A. maculipennis labanchiae* the

last is the vector. Hibernating females of this species begin to leave their winter quarters at the end of February the first generation hatching in April. Mean temperatures below 15°C. and above 25°C. appear to be unfavourable to this insect. The first annual wave of subtertian fever which occurs in June is due to new infections and not to relapses. There are enough crescent carriers in the pre-epidemic season to account for this.

FARID (p 710) has found *A. sergenti* in the Nile valley with a sporozoite rate of 2.7 per cent. This mosquito has not previously been reported from that area, where *A. pharoensis* was generally regarded as the principal vector. Actually *A. pharoensis* was not common in the district investigated and was not found to be infected.

The only important vector in Nairobi, Kenya is *A. gambiae* and SYMES (p 538) shows that during the drier months larvae are to be found in relatively few permanent breeding places but that in the rains great numbers are present in almost every pool pit and puddle. Most of these breeding places are man made. Ideal breeding facilities are provided by the irrigation channels of the swamp used for market gardening. In Kisumu, Kenya, GARCHAM (p 176) reports that the type form of *A. funestus* has a seasonal prevalence much less connected with rainfall than has *A. gambiae* and that the maximum prevalence takes place some 3 months after the maximum rainfall, when the malaria incidence is declining. Nevertheless, *A. funestus* is second only to *A. gambiae* as a vector and shows greater anthropophilic tendencies; the sporozoite rate is higher in the dry season than in the rains. In Durr Daura, Abyssinia BRAMBILLA (p 709) reports that *A. gambiae* can be found at all seasons of the year in small numbers in native huts.

SEAYANON and DE ANDRADE (p 229) show that in Brazil *A. gambiae* prefers small bodies of water exposed to the sun and sand-lined rather than mud-lined pools. It avoids water containing vegetation. In the dry season most of the breeding places are man-made shallow wells or irrigation ditches.

THOMSON (p 333) has made a close study of 4 *minimus* in Assam. The female oviposits at night in shaded running water usually along grassy banks yet heavy shading will eliminate breeding. This anomaly is explained by the secondary results of heavy shading which eliminates vegetation from the water margins and causes, therefore, increase in the rate of flow. Rate of flow is important because the female prefers to deposit eggs in comparatively still water such as is found along grassy edges or in side pockets, even if these have no vegetation, and because contrary to popular belief the larva is ill-adapted to resist being carried away by flowing water. The larva is normally maintained in still water not in avoidance of moving water but by powerful attraction to shade and even if the shaded portion is fast flowing, yet the larva will still seek the shade. Control by shading is therefore due to elimination of small vegetation and consequent increase of water movement, and the same result can be obtained by exposing the stream to light and eliminating all vegetation. It depends on local circumstances which is the better plan to adopt. Larvae of *A. minimus* are killed in 5 minutes at a temperature of 41°C., which is often exceeded in shallow rice fields even when rice shoots, 9 inches apart are 2 feet high. Larvae of *A. kyzicus*, *A. barbatus* and *A. rufus* can survive higher temperatures. Maximum temperatures in the running water breeding places of *A. minimus*

rarely exceeded 35°C. but it is not clear why female *A. minimus* ovipositing at night when rice field water is cool avoids such water.

COVELL (p 228) states that in the U P Terai the chief vector is *A. minimus* which in Bazpur at the height of the malaria season showed a rate of infectivity of 18 per cent. With regard to *A. fluviatilis* in the U P Terai only 1.4 per cent. contained human blood whereas the proportion in the Wynaad S India was 98.9 per cent in one investigation. There are no morphological differences between these mosquitoes from the two places but it is clear that they belong to two quite different biological races.

The important vectors in Bengal are stated by IYENGAR (p 228) to be — In the plains *A. philippinensis* in the submontane area *A. minimus* in the deltaic area *A. sudaicus* but infection was also found in *A. annularis* and *A. varuna*. Total infection rates found were — *A. philippinensis* 6.3 *A. minimus* 18.6 and *A. sudaicus* 15.8 per cent. The investigation covered 14 localities and over 11 000 *Anopheles* were caught in dwellings. SEN (p 711) gives more detail concerning the mosquitoes of Bengal. In the submontane region *A. minimus* breeds in streams terraced rice plots and drains and malaria is intense. In the upper delta *A. philippinensis* breeds in tanks ponds silted river beds and marshes and in some districts malaria is severe. In the lower delta *A. philippinensis* is responsible for some malaria but transmission is chiefly by *A. sudaicus* breeding in fish ponds or rice fields from which sea water has been excluded. In the estuarine area *A. sudaicus* breeds where mangrove swamps have been cleared and is responsible for the increased malaria there. *A. culicifacies* is widespread but appears to be of no importance as a carrier.

WHITE and NARAYANA (p 561) confirm previous findings that the only vectors in the Singhbhum Hills belong to the *funestus* group — *A. fluviatilis*, *A. minimus* and *A. varuna*. Since 1938 anti-larval measures have been restricted to this group and it now appears from the results of catches made with trap nets in the controlled area, that control of *A. varuna* is complete that *A. minimus* has been reduced by more than 90 per cent. but that almost one third of *A. fluviatilis* remains uncontrolled.

AFRIDI *et al* (p 105) have reviewed the literature on the behaviour of adult *A. culicifacies* and report their own observations which should be sought in the original by those interested. WHITE (p 504) sets out the results of dissections of a large number of *A. culicifacies* made in various parts of India. Sporozoite rates were — Trans-Indus 2.3 per cent. Indus-Upper Ganges 0.4 N Gangetic plain 0.06 and S Gangetic plain nil. The mosquito is therefore not an efficient vector in the Gangetic plain but no satisfactory explanation is forthcoming. Eggs provide no evidence of separate races and careful anatomical studies of all stages are called for.

Although *A. culicifacies* is the dominant species in the eastern Satpura ranges of the Central Provinces WHITE and ADHIKARI (p 560) show that infected specimens were found in two only of the 13 localities studied, and that the sporozoite rates were very low. It probably plays a very minor part in transmission. In the hyperendemic areas *A. fluviatilis* and *A. varuna* are the chief vectors.

RUSSELL and RAO (p 559) have found ten species of *Anopheles* breeding in rice fields in the Tanjore district. Of these *A. culicifacies* is the only vector of any importance and it is most prevalent in wet

fields before plunging. When the rice attains a height of 12 inches above the water surface the breeding of *A. culicifacies* is checked, but *A. hyrcanus* becomes more plentiful. It seems, therefore, that the distribution and density of species depends more upon the stage of the rice than upon season. In the Pattukkottai Taluk, Tanjore District, S. India, RUSSELL and RAO (p. 642) have found that with the exception of a few isolated infections in *A. subpictus* and *A. regus* the only infected anopheline was *A. culicifacies* with a sporozoite index of 0.061 per cent. This rate is low but is apparently enough to account for average spleen and parasite rates of 40 and 30 per cent. respectively.

WHITE (p. 505) states that neither *A. stephensi* nor the *myaovensis* form have been found to be infected in Calcutta [it will be remembered that *A. stephensi* is an important vector in Bombay and elsewhere].

RUSSELL and RAO (p. 228) record their observations on the association of larvae of *Anopheles* species in south-eastern Madras.

In the province of Human Central China, ROBERTSON (p. 103) found *A. hyrcanus* var. *sincensis* to be the most prevalent anopheline and the most important vector of malaria, but in the south-western part of the province *A. minimus* and *A. maculatus* were found in the hilly regions, and *A. minimus* is there important in the spread of the disease. On the China Burma road however he (p. 501) reports that although *A. hyrcanus* var. *sincensis* is the most prevalent species, and is occasionally infected it is not an important vector. *A. minimus* is responsible for most of the transmission, and where it is abundant, subtertian malaria is prevalent. A similar opinion is expressed by WILLIAMS (p. 502).

HU (p. 176) shows that in Shanghai *A. hyrcanus* var. *sincensis* has a considerable predilection for bedrooms: screening these may therefore be an effective antimalaria measure. Although *A. hyrcanus* var. *sincensis* is the most important vector near Shanghai, the same author (p. 105) reports that it is found in very much greater numbers in cowsheds, pigsties and goat stables than in adjacent human habitations.

BARRAS (p. 174) reports an outbreak of malaria in Lahuy island, Philippines, which was reputed to be free from the disease until labourers were imported. *A. flavirostris* and *A. maculatus* were found breeding there.

HOMP (p. 106) reports the finding of larvae of *A. darlingi* in pools alongside a creek in British Honduras, and of adults in Guatemala. The range of this vector is therefore far north of the previously known limit in Venezuela and British Guiana.

BOYD and JOHNS (p. 106) show that a strain of *A. albimanus* from Panama was less susceptible to infection with strains of *P. falciparum* from Mexico and Florida than was a strain of *A. quadrimaculatus* from Florida, but that both were equally susceptible to a strain of *P. falciparum* from Panama.

PIRORZI (p. 409) states that in part of the coastal area of the State of Rio de Janeiro the principal vector is *A. albimanus* though *A. darlingi*, *A. argyritarsis* and *A. tarsimaculatus* also transmit malaria.

THOROUGHMAN (p. 505) reports that in the Soochow hospital, in China, the transmission of malaria by blood transfusion is common in spite of the fact that the blood of donors is examined for parasites before transfusion is undertaken, and that if parasites are found that donor is not used. It is, of course, realized that a negative blood smear does not exclude infection and that latent infection in the recipients cannot be ruled out, but it is probable that some at least of the patients

are infected from the donor blood. [No mention is made as to whether the transfusions are made direct or the blood stored before use] The attacks are readily controlled by quinine and no attacks were produced in patients who for 3 days after transfusion were given prophylactic quinine.

MOST (p 174) reports on malaria in drug addicts in New York in whom infection is acquired from the indiscriminate use of unsterilized syringes for intravenous injection. Most of the infections were with *P. falciparum* and many deaths occurred in the series of 200 cases investigated. The majority of the fatalities were due to cerebral infection. MOST and JOLLIFFE (p 175) give details of the treatment adopted in cases of malaria in drug addicts. Quinine is given intravenously if the nervous system is involved with large quantities of glucose saline to which is added 10 mgm. thiamin chloride parenterally. Blood transfusion may be used in certain circumstances and cerebrospinal fluid may be withdrawn. When acute symptoms subside atabrin is given and plasmoquine may be needed if gametocytes are present. By these means the death rate in severe cases has been greatly reduced. CHUNG *et al* (p 106) record 22 cases of subtertian malaria in drug addicts in Peiping. The disease is transmitted in the process of intravenous injection of morphine or heroin since in the drug dens no attempt is made to sterilize the syringes used and blood from each recipient is drawn into the syringe at each injection. Clinically the infections were severe.

Pathology

In a consideration of the pathology of malarial coma OGURTSOVA (p 642) suggests that the condition is due to heavy invasion of the cerebral capillaries by the parasites accompanied by a general or local depression of the reticulo-endothelial system. Haemorrhages and necrotic lesions are absent from the cerebral cortex where circulatory compensation is rich but this great capillary network offers a wide field for the toxic activity of the parasites which results in diffuse affection of the grey matter and the grave symptoms observed in malarial coma. Cardiac weakness which is a marked feature is due to blockage of the vascular system with stasis and haemorrhages and a consequent reduction of blood pressure. MALKIEL (p 643) states that the pathological process in malarial coma represents meningo-encephalitis with granulomata resembling those found in infectious encephalitis. These are localized chiefly in the white matter of the cerebral hemispheres in the corpus striatum internal capsule nucleus dentatus of the cerebellum and sometimes in the subependymal region but not in the cerebral or cerebellar cortex or the cerebellar white matter.

Clinical Findings

SANFORD *et al* (p 337) report on 48 cases of malarial coma, in 3 of which *P. vivax* only was found in the blood. In comment, WHITE points out that the failure to find *P. falciparum* in blood smears does not preclude the possibility of *P. falciparum* infection. BHATTACHARJEE (p 644) reports a case of cerebral malaria in which the patient was afebrile but had a series of epileptiform attacks a few hours before death. SARKAR (p 644) reports a patient with malaria who was during the attack completely mentally deranged. He recovered quickly under treatment with quinine. NARAYAN (p 712) records a case

Tropical Diseases Bulletin

of cerebral malaria simulating meningitis which was refractory to quinine but in which atabrin effected cure.

DASIEL (p. 177) reports 9 cases in which malaria simulated acute abdominal disease. In 7 the infection was due to *P. vivax* in 2 to *P. falciparum*. There was usually acute abdominal pain and in some cases rigidity but high fever was not a prominent symptom. The existence of leucopenia was suggestive in diagnosis. All these patients recovered in response to malaria therapy but the author quotes another case in which tertian malaria was complicated by localized peritonitis arising from a perforated duodenal ulcer.

HERSCH (p. 230) states that in Nairobi many of the patients with dysenteric symptoms associated with malaria are cured of their dysentery by quinine.

LIEW TJIAN TIE (p. 711) reports 7 cases of congenital malaria in the Netherlands East Indies, and PIK GING HOO (p. 711) one in an infant born in Amsterdam. He discusses the possible mechanism of transplacental infection.

Since the red blood cells contain twenty times as much potassium as the plasma ZWETZER *et al.* (p. 336) have considered the possibility that the release of potassium from the cells at the time of rupture of the merozoites may be the cause of the paroxysms of fever in malaria. They found a marked increase in plasma potassium, which is accompanied by chills and precedes the rise in temperature.

The base line potassium values tend to increase with progress of the infection. MEER *et al.* (p. 582) have investigated the taking power of bile on blood from normal persons and from those suffering from malaria. The red cells of malarious patients were laked in rather shorter time than the normal, and the taking of quinine or plasmoquine appeared to increase the sensitivity of the cells in malaria.

MORR and TEWISSBURY (p. 844) give details of the laboratory findings in the malaria of drug addicts. Macrocytic anaemia was common, bilirubin in the blood was often increased serum albumin reduced and globulin frequently increased.

BOYD (p. 411) reports a study of therapeutic quartan malaria. In 5 cases the infection was naturally induced in these the incubation period was 4 to 5 weeks, but parasites were found in the blood 3 to 12 days before the clinical onset. In 43 cases trophozoites were inoculated intravenously in these the average incubation period was 19.2 days, but parasites could often be found 10 days earlier. The mean duration of naturally induced disease was 132 days, of artificially induced disease 82 days. In general parasite densities were low but in one case 114,000 per cmm were found and the patient died (spite of quinine apparently as a result of quartan malaria). ANDERSON and BENNETT (p. 506) describe a case of quartan malaria in which the parasites could not be found in the blood though they were present in fairly large numbers in the sternal marrow. Pigmented and non-pigmented forms of *P. vivax* were found in the marrow but not in the blood. The authors discuss the question of exo-erythrocytic forms of parasites. BOYD and PROCTOR (p. 563) found that in two patients with quartan malaria and oedema there was a definite association between the albuminuria which occurred, the depression in plasma albumin and the oedema. This combination suggests nephrosis rather than nephritis. In benign and subtertian infections these three factors were not closely associated.

YOUNG *et al* (p 334) have shown that the segmentation time of *P. malariae* is undoubtedly affected by changes in the sleeping time of the host but not by light or darkness

From a study of patients repatriated from E Africa CASTELLI (p 708) concludes that febrile relapses of malaria are rare after 15 months from the date of infection and exceptional after 2 years. Relapses due to *P. vivax* were ten times as frequent as those due to *P. falciparum* though the latter infection was the more common.

VENHUIS (p 563) reports that the flagellate *Bodo caudatus* present in distilled water used for the dilution of Giemsa stain was mistaken for the malaria parasite and that this mistake led to the report of an outbreak of malaria which did not exist. The use of freshly distilled water should prevent this error

CASTRO (p 230) describes a rapid method of staining thick blood films which cannot be further abstracted

STRATMAN THOMAS and DULANEY (p 336) have failed to obtain any skin reaction which could be regarded as specific for malaria although several forms of antigen were used. Similarly they could not obtain any specific precipitin reaction. With the complement fixation reaction on the other hand, highly specific results are obtained in malaria with antigens prepared from either human or monkey-parasitized blood. Details of the preparation of these antigens are given. These authors later (pp 411-412) describe the production of antigens from *P. knowlesi*, *P. vivax* or *P. malariae* which give strong complement fixation reactions with sera from malarious patients. These are therefore group reactions and are not modified by syphilis. Complement fixation reactions are closely correlated with the presence of parasites in the blood but a negative reaction cannot be taken as a certain indication of absence of parasites. In diagnosis the reaction might be valuable in subtertian malaria where parasites though present in the body are absent from the peripheral blood. These antigens are not useful for skin or precipitin reactions

WOLFF (p 291) describes a simplified technique for his buffer precipitin test for the diagnosis of chronic malaria. Blood should be taken in the morning before breakfast and not in the febrile stage

ASAI (p 507) records the results of the Henry reaction in which artificial melanin gave on the whole better results than natural melanin.

OU (p 507) has investigated the Takata reaction in malaria. It is more often positive in chronic than in acute cases.

Charles Wilcocks

[To be continued]

FEVERS OF THE TYPHUS GROUP AND OTHER FEVERS

BUCHWALD (Hildegard) Untersuchungen ueber Normalagglutinine gegen Proteus X-Stämme [Agglutinins of the *Proteus* X Group in Normal Sera.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1941 May 12, Vol. 99 No. 6 pp 409-418.

Tests were made of the sera of 300 persons who were known to be free from any suspicion of having had typhus fever. Live cultures of

selected strains were used and the final readings were made after 14 hours incubation at 37°C.

The responses were classified as follows —

- (1) Macroscopic flocculation in clear liquid = ++
 (2) " " " " in turbid liquid = +
 (3) Flocculation visible only with agglutinoscope = ±

The results were —

1-25	1-50	1-100	1-200	OY19	OY3	OYA
—	—	—	—	110	67	193
—	—	—	—	89	101	73
±	—	—	—	73	72	32
±	±	—	—	16	4	2
±	=	±	—	11	22	0
—	=	—	—	0	3	0
—	=	±	—	0	1	0
—	—	±	—	1	0	0
± +	—	=	—			

Only two sera gave a definitely positive reaction in dilutions of 1-50 one of these to *Proteus* OY19 and one to OY2.

Of the persons from whom the sera were taken 180 were pregnant women, 90 gave positive reactions to tests for syphilis, 10 had accelerated sedimentation rates of the red corpuscles and 5 had trachoma, but none of these conditions made any appreciable difference to the response.

[A point that still remains to be cleared up is whether sera which give positive reactions in dilutions of 1-25 would show a rising titre during attacks of typhoid or other non-Rickettsial fevers. Till this matter has been investigated some doubts will remain as to what constitutes a significant reaction.]

John W. D. Megaw

McCONOMACK (J. D.) (Typhus Fever in the Town of Drogheda.)—
Report Dept of Local Govt & Public Health Dist 1933-1940
 Appendix III pp 136-137

In this report an account is given of an outbreak of typhus in Drogheda in which there were 5 cases with 3 deaths. The origin is ascribed to some old articles which had been stored away in a trunk for many years, and had lain undisturbed until they were acquired by the family who were (or presumably subsequently became) chiefly affected by the typhus. The house where this trunk had come from had passed through at least two devastating epidemics of typhus fever. [There would seem to be ground for the opinion that this infection may have been contracted by inhalation of infected material from the contents of the trunk. Lice cannot live long away from man, but it is known that Rickettsiae in dried louse faeces may remain alive for a year or more.]

C W

ROMERO ESCACENA (G). Estudio clínico y experimental del tifus exantemático —Epidemia de Sevilla (Primera comunicación.) [An Outbreak of Epidemic Typhus Fever in Seville]—*Rev Clin Española* 1941 Apr 1 Vol 2, No 4 pp 349-357 With 7 figs. [32 refs.] German summary

This paper gives a full and graphic account of an outbreak of louse-borne typhus fever which appeared in the spring of 1940 and disappeared suddenly with the establishment of summer weather conditions.

All the patients 93 in number were louse infested most of them came from a hostel for beggars where the inmates were living in deplorable conditions. There were several minor foci of infection in places visited by the beggars in the course of their wanderings.

The age distribution was as follows —29 patients were under 10 years of age 15 were between 10 and 20 27 between 20 and 40 and 22 were over 40.

The total case mortality rate was 18 per cent it was nil in patients under 20 years of age about 9 per cent between the ages of 20 and 40 it then rose steeply reaching 100 per cent in persons over 55.

Some of the chief clinical features were as follows —

In 94 per cent. of the cases the onset was sudden with intense headache giddiness nausea sometimes also vomiting chills and generalized body pains. In young children the onset and course of the fever were often irregular and the attacks very mild. Restlessness and insomnia were pronounced for the first two to four days, afterwards there was stupor or coma.

The rash usually appeared on the 3rd to the 7th day but in a few cases it was not detected till the 9th day it was often obscured in the early stages by pigmentation of the skin and the presence of other lesions. The rash was always petechial never papular it often appeared earlier and was more pronounced over the deltoids than in other regions. In one case it was clearly seen on the palms and soles one child had a few petechiae on the face. In three of the fatal cases the rash was purpuric.

The author calls special attention to pronounced tenderness of the slightly enlarged spleen in the early stages he observed this condition in every case and regarded it as a feature of great diagnostic importance.

The leucocyte count exceeded 8 000 in 94.4 per cent of the cases in about 47 per cent. it ranged from 20 000 to 31 000. All but one of the fatal cases had counts of more than 18 000.

The usual agglutination response to *Proteus* $\lambda 19$ occurred in most of the cases the reaction frequently remained negative till about the 8th day but in one patient it did not become positive till the 19th day. In 6 per cent it remained negative during the whole period of observation.

There were several positive Widal reactions to *Bac. typhosus* in one case up to a titre of 1-500. These reactions were probably due to previous attacks of typhoid fever and two of the patients who reacted were known to have been treated recently for this disease.

Prophylactic vaccination with live murine virus prepared by a modification of Laigret's method was tried the results were not conclusive but the vaccine was quite innocuous.

The author discusses the possibility that the infection was of the murine type but there were good reasons for rejecting this hypothesis.

[March, 1942]

In the discussion it is stated that a diagnosis of murine typhus is never justified unless all the following conditions are fulfilled: (1) The first case must have been observed; (2) louse infestation must have been excluded; (3) there must have been no possible contact with an infected person; and (4) murine virus must have been isolated from rats found on the premises occupied by the patient.

Convalescent serum did not appear to benefit the three patients to whom it was given. Various special remedies were tried, but all were found ineffective. Cardiovascular tonics were regarded as fundamental in the treatment of the disease.

J W D V

ROCKETTELLER FOUNDATION REPORT OF THE HEALTH COMMISSION JUNE 27 1940 TO JUNE 30 1941 pp 78-82—Typhus Fever [Summary appears also in Bulletin of Hygiene]

This is an account of the work done by members of the staff of the International Health Division in Spain. Typhus was reported in March 1941 in small towns in N. E. Spain and 80 cases were recorded. At that time there occurred 54 cases in Madrid and further cases were reported until May. About 20 000 persons were vaccinated with the Cox yolk sac vaccine. 5 cases of typhus were reported in laboratory workers who had received this vaccine and after a period thought enough for immunity to have developed but the infections were mild. The Cox vaccine protects guinea pigs against 1 000 doses of virulent guinea pig material, and has made a good impression on health officials in Madrid.

In Malaga an epidemic of typhus began early in March 1941 and by the middle of July 2 000 cases had been reported. It is believed that at least 4 000 actually occurred. This high summer incidence was regarded as a warning that an extensive epidemic might occur in the winter of 1941-42, and that the disease might spread north and east in Europe from the focus in Spain.

(It is worthy of note that in the Public Health Reports Washington, 1941 Nov 28, Vol 58 p 2319 there is a record of typhus as follows:—Spain, Jan-Aug 1941 8,906 cases, Sept 172 cases, Oct (first 3 weeks) 71 cases Germany Jan-Aug 1941 1,531 cases, Sept., 147 cases, Oct (first 3 weeks) 49 cases. In the same publication (Nov 14 1941) at p. 2231 a table gives in detail the number of cases reported from the various Provinces of Spain during the first 8 months of 1941.)

C II

GROOT (Hernando) MAYORAL (Pedro) & MARTÍNEZ (Luis E.) Tifo exantemático en Varifo [Typhus Fever in Maricao].—Rev. Facul. de Med. Bogota, 1941 May Vol. 9 No 11 pp 770-778. With 1 chart & 1 map.

[Maricao is a department of Colombia near the equator]. Twenty two cases of typhus were observed in one year among poverty-stricken and louse-infested persons living in widely separated localities at altitudes ranging from 4 000 to 8,000 feet. The attacks occurred in isolated cases or in small family outbreaks. Many other cases must have occurred.

The serum reactions were positive to Proteus X19 in titres of 1-60 to 1-5 040 only in six cases was the titre less than 1-300. Negative responses were found to Proteus X2 and O1A and to organisms of the typhoid paratyphoid and undulant fever groups.

Guineapigs inoculated with the blood of patients had a febrile reaction lasting about six or seven days. The Mooser reaction was feeble or negative. None of the animals died. Rickettsiae were found in the tunica vaginalis of some of the animals.

The authors state that the investigation of the virus is at too early a stage to justify any dogmatic assertions about its characteristics but they point out that conditions are favourable to its spread by lice [Compare the micro-epidemics of the Peruvian highlands; this *Bulletin* 1940 Vol 37 p 564] J W D M

GROMASHEVSKIY (L. W.) Die Ergebnisse der experimentellen Methode beim Studium einiger Fragen der Epidemiologie des Fleckfiebers. [An Experimental Study of Some Aspects of the Epidemiology of Typhus Fever]—*Acta Med URSS* Moscow 1940 Vol 3 No 3 pp 290-300 With 4 figs.

Much of this paper consists of a sharp criticism of the readiness with which so many workers have accepted the hypothesis of inapparent infections and healthy virus carriers of typhus fever. Special objection is taken to evidence based on slight or moderately positive Weil-Felix responses [see above BUCHWALD] and on febrile reactions in experimental guineapigs. The author gives a number of examples of false positives which he has encountered in his animal experiments. He refers to the numerous investigations in which there has been a complete failure to isolate the virus from the blood of convalescents more than two or at most three days after the end of the fever.

He himself tested the blood of 25 patients: in 15 cases the blood was taken 4 to 6 days before the fall of the temperature and 13 were positive; in 10 cases examined up to 3 days before the end of the fever there were only 3 positives. Of 16 cases examined on the first day of convalescence three were positive but all the 9 cases examined 2 to 3 days after the fall of the temperature were negative.

He next tested about 30 persons who were known to have had the disease at varying intervals beforehand: no virus was found in any of them.

He then selected about 30 persons who were known to be living in conditions of great risk of infection and in fact three of them had subsequent attacks of typhus—2, 5 and 22 days respectively after the blood was taken—virus was found only in the case in which the disease appeared two days later.

From these experiments and from a critical study of the published records the author concludes that there is no evidence of the existence of healthy carriers of the virus or of inapparent infections.

J W D M

VEINTEMILLAS (Félix) El antígeno a *Proteus* X 19 como rápido medio de diagnóstico del tífus altiplánico. [A Rapid Method of diagnosing Altiplano Typhus (Epidemic Typhus) by *Proteus* X19]—*Suplemento d Inst Nac Bact* La Paz Bolivia 1941 June pp 40-44 With 1 fig.

The method is a modification of the test described by CASTAÑEDA and his colleagues: this in turn is a modification of the technique originated by WELCH in 1936.

A drop of the patient's serum is placed on a clean glass slide and mixed with a drop of a blue-tinted suspension of *Proteus* X19 or other bacillus of the *Proteus* group. When the reaction is positive blue clumps appear within one or two minutes. The clumps are easily seen with the naked eye. The reaction is regarded as negative when the mixture remains homogeneous or shows only very fine granules.

A drop of blood can be used instead of serum, but sometimes there is haemolysis which causes a reddish tint in the mixture. Sometimes also there is clumping of the red cells and the formation of a brick-red deposit.

The suspension of bacteria is made from 24-hour gelatine cultures made on Petri dishes. The colonies are used to make a concentrated mixture in normal saline to which 10 per cent formalin has been added. After 24 hours this is filtered through gauze and mixed with a 1.1 per cent solution of citrate of soda so as to make a milky emulsion. A few drops of 1.0 per cent methylene blue are added to give the blue colour.

By mixing a number of different strains of *Proteus* X19 a polyvalent test suspension can be made. Suspensions of *Proteus* OXK and OX2 can also be used in the same way.

The test proved quite satisfactory in a considerable number of hospital cases and is strongly recommended for the use of private practitioners. [See also this *Bulletin* 1941 Vol. 33, p. 448. In the present work the strains used are referred to as *Proteus* X19 Arg. OX19 X19LP. Presumably the O variants were used in each case.]

J. H. D. M.

MUSK (Fritz). Ueber die cerebralen Krankheitserscheinungen beim Fleckfieber. Cerebral Symptoms in Typhus.—*Archivos do Inst. Biol. Buenos Aires*. 1940. Vol. 11 pp. 309-318.

ROSSIYKY (D. M.) [Disinfection and Prophylactic Measures in Typhus and Relapsing Fever].—*Soviet Med.* 1940 No. 3.

The author writes of two preparations useful in the control of lice. The first, "Nasecamoyad" is "a 10 per cent solution of kerosene-carbolic soap." The second, "Solvent," a product of benzole and toluol derived by fractional distillation and retaining their highest homologues. The former does not irritate the skin, destroys lice quickly but its protective action lasts only 2 to 4 days. The fumes of "Solvent" destroy lice in 9 to 12 minutes. The substance is stated to cause no harm to human tissues.

Three other preparations are mentioned but full details of their composition are not given. On the whole the two named above are regarded as the best, but it is pointed out that in the control of lice personal hygiene and cleanliness are essential.

C. H.

CHASOVNIKOV (A. A.) [Examples in combating Local Foci of Typhus Exanthematicus in Rural Conditions].—*Soviet Med.* 1940 No. 9.

The author states that cholera, relapsing fever and smallpox have disappeared from the territory of the Soviet Union, and that in the Ukraine typhus has declined in recent years. There remain foci of typhus, and that at Kremenchug, where there was an epidemic outbreak

in 1938-1939 is considered. It is pointed out that the spread of the disease was largely due to mistaken diagnosis delay in transfer of patients to hospital and unsatisfactory decontamination. Other authors have reported cases of typhus in which no rash was seen [see this *Bulletin* 1941 Vol 38 p 440] but the present author states that no case of his has been confirmed in the absence of this cardinal sign. In all cases there was a typical temperature with crisis or lysis on the 13th to 15th day.

The method of combating an outbreak is as follows. A group of medical workers under an epidemiologist is sent to the region concerned, patients are sent to hospital and disinfection is commenced. This consists of disinfection of the room [presumably that occupied by the patient] cutting of the hair or washing in Solvent solution [presumably of contacts] bathing of all members of the family and

Solventization of the bed [There is curiously no mention of disinfection of garments and no reference to heat treatment.] Visits to the homes of neighbours are made and often result in the discovery of cases or of convalescents. Contacts are observed daily for at least 30 days temperatures are taken and persons showing a rise are sent to hospital.

Mass disinfection of school-children is carried out and is combined with visits to the homes of the children so that any homes in which lice are found can be dealt with. Children absent from school are visited on the first day of absence so that early diagnosis may be made. Instruction of the people is carried out with the help of the local Soviet and of the administration of the collective farms. C IV

LIU (Wei Tung) & ZIA (Samuel H) *Studies on the Murine Origin of Typhus Epidemics in North China. I Murine Typhus Rickettsia Isolated from Body Lice in the Garments of a Sporadic Case.*—*Amer J Trop Med* 1941 July Vol 21 No 4 pp 507-523 [With 2 figs [51 refs]]

This paper deals with the important problem of the relationship between the human and murine Rickettsiae.

A louse infested inhabitant of Peiping who had been living in an inn infested with rats mice and fleas had a moderately severe attack of typhus fever with a pronounced Weil Felix reaction. There was no evidence of contact with an infected person the clinical and epidemiological evidence pointed equally to louse-borne and flea borne infection.

Altogether 54 lice were recovered from the patient's clothing. Smears made from four of these showed no Rickettsiae. Each of two guinea pigs was inoculated intraperitoneally with the crushed bodies of 25 of the lice and two other guinea pigs were given 5 cc each of the patient's blood by the same route. All the animals reacted with fever in 6 to 7 days but there was no scrotal swelling. Emulsions of the brain or brain and tumca in doses of $\frac{1}{2}$ to $\frac{1}{4}$ of the total emulsion were inoculated into other guinea pigs and the virus of blood and louse origin was passed through guinea pigs for 13 and 14 generations respectively. Rickettsiae were often recovered inapparent infections were rather frequent, the duration of the fever was relatively short nodular lesions were either scanty or absent in the brains there was some degree of congestion and infiltration of the tumca vaginals but the typical Neill-Mooser reaction was conspicuously absent.

Virus of both strains originating from infected guineapigs was passaged 15 times through albino rats and 5 times through mice. Of 50 guineapigs inoculated, 3 died of 60 rats 6 died but of 87 mice 28 died before the 10th day.

From their own previous observations and others recorded in the literature the authors conclude that they were dealing with murine Rickettsiae despite their failure to produce the typical Weil-Mooser reaction in guineapigs. They go on to state "It was concluded that, in North China as in Mexico when louse-infested persons contract murine typhus the body louse may become a carrier of the murine Rickettsiae and, in all probability may give rise to small or large epidemics under favourable circumstances." [See this *Bulletin* 1941 Vol. 38 p. 682, and, for Shanghai, 1940 Vol. 37 pp. 256-569.]
J W D M

LIU (Wei-tung) & ZIA (Samuel H.) Studies on the Murine Origin of Typhus Epidemics in North China. II. Typhus Rickettsia Isolated from Mice and Mouse-Fleas during an Epidemic in a Household and from Body Lice in the Garments of One of the Epidemic Cases.—*Amer J Trop Med* 1941 Sept Vol 21 No 5 pp 805-825. With 2 figs & 1 chart [44 refs.]

This paper describes the investigation of a family outbreak of typhus fever in Peiping.

Between the 4th and 26th March, 8 out of 9 louse-infested persons living in a house overrun with mice were attacked. Their ages were — 9 10 14 15 43 46 57 and 59 — the two oldest died, the others survived.

Four mice were trapped in the house and 12 fleas, *Leptopsylla saxiculi* were collected from them. Three strains of virus were isolated—(1) from the fleas, (2) from the mice and (3) from lice found on one of the patients.

The flea-strain of Rickettsiae was passaged for 11 generations through 20 guineapigs, of which one died and none showed a scrotal reaction. Rickettsiae were never found in smears of the tunica vaginalis of the guineapigs, but were detected in mice inoculated from a guineapig at the 5th passage. After 5 passages in guineapigs the strain was transferred to albino rats and was maintained in them for 17 generations. Five guineapigs were inoculated from these at various passages — all had typical fever and four showed pronounced scrotal swelling. Virus from a rat at the 9th passage was transferred to mice and was maintained for 5 generations.

This strain was regarded as conforming to the murine type of Rickettsia — the absence of scrotal reaction in the guineapigs used for the direct passage of the virus was not regarded as evidence against this view because several authors have reported a similar finding in some murine strains.

The mouse-strain of the virus was subjected to the same tests — but Rickettsiae could not be detected even in mice which were inoculated with virus of the 5th generation from guineapigs, and the virus died out after 8 passages in rats which were inoculated from guineapigs at the 4th passage. The authors comment on this is "That a typhus strain isolated from house mice was incapable of surviving beyond 8 passages in rats is not in accord with the reported behaviour of the murine Rickettsia and is an entirely unexpected finding, especially in view of

the typical murine characteristics of the strain isolated from fleas of the same mice. We can offer no satisfactory explanation of this discrepancy of behaviour between the mouse and flea strains in experimental animals.

The third strain isolated from lice found on one of the patients corresponded in general to the mouse strain.

In the discussion the authors state that theoretically it is not impossible that the disease was historic typhus and that the mice had been infected from the patients but it was difficult to see how historic virus could be transmitted from men to mice in natural conditions and also how the first patient could have become infected from outside sources seeing that he had practically never left the house. It seemed much more likely that the infection was conveyed from the house rodents to man by their fleas and then from man to man by human lice. The authors incline to the view that the initial case was caused by the bite of infected mouse fleas rather than the more usual rat fleas though mouse fleas ordinarily do not attack man.

[The findings are open to various interpretations but one important point emerges that the commonly accepted criteria for distinguishing between the viruses of historic and murine typhus have been discredited in this case.]

It is hardly conceivable that the virus isolated from the fleas should have been different in type from that of the mice which harboured the fleas yet the former was transmissible indefinitely through rats and caused a scrotal reaction while the latter died out after eight passages in rats and did not cause a scrotal reaction.] *J W D M*

TUCKER (C B) WOODRING (Thomas V) & ESSICK (Harry C) An Outbreak of Endemic Typhus Fever in Nashville, Tennessee Its Epidemiology and Control.—*Amer Jl Public Health* 1941 Sept Vol 31 No 9 pp 917-925 With 4 figs

The report deals with 75 cases of endemic typhus fever in Nashville Tennessee a town with a population of 166,312 inhabitants.

The onset occurred in Sept. Oct. and Nov. 1939 in 67 of the cases.

The great recent increase in the number of cases is only partly explained by better diagnosis there seems to be a spread of the disease from the Atlantic coast to the interior.

In 70 cases the probable source of infection was determined in all of these there was an exceptional degree of association with rats in three well-defined foci of infection. The persons attacked were employees at or visitors to grain mills seed stores and other buildings with large rat populations or were persons living or working in the vicinity of such places. Only six of the patients were less than 20 years old. Whites and negroes were almost equally affected.

The clinical manifestations are of interest. A red macular or maculo-papular rash appeared on the 5th or 6th day in most cases on the lower chest or upper abdomen a petechial rash was only seen in 2 cases. The rash could seldom be detected in coloured patients and in two of the white patients it was absent.

The average duration of the fever was 15 days the extremes being 9 to 40 days. There were only 2 deaths.

There was agglutination of *Proteus* $\lambda 19$ in dilutions of 1-160 or more in all the 73 cases in which the test was made.

Control was by centripetal rat destruction, rat-proofing of buildings and general tidying up of the premises affected.

In 1940 there were 14 cases in two of the previous foci of infection and four in a fresh focus—a dog-food factory J W D M

BRIGHAM (George D.) Two Strains of Endemic Typhus Fever Virus Isolated from Naturally Infected Chicken Fleas (*Echidnophaga gallinacea*).—*Public Health Rep* 1941 Sept. 5 Vol. 56. No. 36. pp 1803-1804

The author reports the first isolations of murine virus from the chicken flea *E. gallinacea*. The first group of 135 of these fleas was recovered from two rats from a farm in Georgia—the virus was present in a pool of these fleas and was shown to be that of endemic typhus by guinea-pig passage. Endemic typhus virus was also isolated from the brains of the rats and from pools of *Y. chagasi* and *L. segnis* recovered from them. The owner of the farm on which the rats were caught was suffering at that time from the disease. A second strain similarly proved to be that of murine typhus, was isolated from a pool of *E. gallinacea* from a rat in the city of Albany Georgia. C W

BENGTSON (Ida A.) & TOPPING (Norman H.) The Specificity of the Complement Fixation Test in Endemic Typhus Fever using a Rickettsial Antigen.—*Public Health Rep* 1941 Aug. 29 Vol. 56 No. 35 pp 1723-1727

Complement fixation tests were carried out in 15 proved and 37 clinically diagnosed cases of endemic typhus fever—there were 92 control tests in cases of other diseases including tuberculosis leprosy malaria, syphilis, tularemia typhoid fever etc. The antigen was prepared from a wild-rat strain of *Rickettsia* grown in the yolk sacs of chick embryos.

In 12 of the 15 proved cases of endemic typhus there were positive reactions in dilutions ranging from 1-16 to 1-1,024. In the other 3 the reactions were 1-4 to 1-8, but the disease had occurred from two to three years previously. In 32 of the 37 clinically diagnosed cases positive reactions occurred in dilutions of 1-8 to 1-1,024—the remaining 5 cases were positive in dilutions of 1-2 to 1-4.

All the control cases gave completely negative reactions, except that in 7 of the 10 cases of leprosy there was slight fixation in dilutions of 1-2, and that in sera which had been stored for a long time from cases of tularemia and undulant fever there was partial fixation in dilutions of 1-4 and 1-8. The Weil-Felix reactions of the typhus sera were positive in dilutions of 1-40 or less in most of the cases in which the disease had occurred more than a year previously.

In many of the cases in which the disease had occurred within the previous twelve months the Weil-Felix titre was low while the complement fixation titre was high, but in a number of cases there was a certain amount of correlation between the reactions.

It was concluded that the complement fixation test for endemic typhus fever is specific. J W D M

KOUWENABE (W.) De Nederlandsch-Indische Rickettsiosen. [Rickettsial Diseases of the Netherlands Indies].—*Geneesk. Tijdschr. v. Nederl. Indië*, 1941 Jan. 6 Vol. 81 No. 1 pp 41-52

WOODHEAD (L S F) & DUTTA (U C.) A Note on Fevers of the Typhus Group in Assam.—*Indian Med Gaz* 1941 July Vol 76 No 7 pp 406-407

This investigation deals with persons living in various localities of Assam a province from which there are no records of the occurrence of cases of typhus fever

Sera of 203 patients suspected of having enteric fever were tested against *Proteus* OX19 OXK and OX2 Reactions considered diagnostic of a fever of the typhus group occurred in 17 cases Of these 8 fell under the head scrub typhus 6 were probably murine and 3 tick typhus.

The criteria were— standard agglutination with OXK at 1-150 and over and with strain OX19 at 1-125 or over the Widal test not suggestive of the enteric group and the short history sent with the serum

One serum was positive to OXA 1-3 500 the strongest reaction to OX19 was 1-275 in the latter case death occurred on the 11th day

A few details are given of four typical cases in which the results of the standard agglutinations were —

	Day of disease	OXA	OX19	OX2	Rash
(1)	10th	1-350	Neg	1-17	Nil.
(2)	10th	1-55	1-275	1-27	No mention.
(3)	19th	1-3 500	1-85	1-40	Nil.
(4)	28th	1-800	1-27	1-27	Nil

[It would be interesting to know the criteria on which the authors relied for distinguishing scrub murine and tick typhus from each other and from epidemic typhus]

J W D M

GISPEN (R.) Het kweken van rickettsiae in eendeneieren [The Cultivation of Rickettsiae in Ducks' Eggs].—*Goneesk Tijdschr v Nederl Indië* 1941 Sept. 9 Vol 81 No 36 pp 1907-1925 With 4 figs on 1 plate. [14 refs.] English summary

The chorioallantois of developing ducks eggs is very suitable for the propagation of viruses and rickettsiae. For this purpose the egg of the dutch runner deserves to be given preference to the hen's egg. The following advantages of ducks embryos are mentioned they are more viable under laboratory conditions virus infection causes less rapid death of the embryo the duck's embryo requires an incubation of 26-27 days before they hatch that is five days more than the chicken embryo the part of the egg membrane available for inoculation is larger it therefore produces also a larger quantity of virulent material.

In regard to its bactericidal power for small quantities of certain non pathogenic micro-organisms the chorioallantois of ducks eggs resembles the peritoneum of animals

Scrub typhus- and Sumatran mite fever rickettsiae which failed to grow on the chicken-egg membrane can easily be propagated on

the chorioallantons of ducks eggs. Nine cultures of scrub typhus rickettsiae have been investigated during a various number of egg passages in one case twenty passages were made.

These rickettsiae produce big round prominent foci, which appear five days after the inoculation and have been completely developed on the 7th-8th day. The central portion of some foci shows a collapse like the umbilication of a smallpox pustule.

"Sections of the infected membranes show very extensive inflammatory changes in the mesodermal and ectodermal layer with numerous eosinophil leucocytes.

The effects of some factors influencing the membrane lesions are described.

"Numerous rickettsiae of the orientalis type are found in various cells of the chorioallantons and out of them.

"The liver and the spleen of the embryo may also show many rickettsiae especially in macrophage-like cells. As an exception a few rickettsiae are found in the cerebrum of the embryo. Histologically these internal organs did not show any changes. These findings are different from those made in the same organs of infected animals, which show as a rule histologically distinct lesions but macroscopically no rickettsiae.

"The embryo dies about ten days after the inoculation showing by autopsy neither ascites nor other changes. Young ducks inoculated intraperitoneally with scrub typhus rickettsiae from infected guinea pig brains and egg membranes did not show clinical symptoms therefore they have a natural immunity for infections with certain germs, which are pathogenic for the embryo of the same species.

The egg passage strains have been tested for virulence to mice and guinea-pigs but no changes in virulence have been observed after one to twenty passages. The egg membrane the internal organs and the heart blood of the embryo are infectious for mice.

"The localization of the rickettsiae in the animals infected with egg passage strains is just the same as in animals inoculated with a guinea-pig strain therefore the organotropism in animals has not been changed. The different localization of rickettsiae in the duck's embryo is due to the particular portal of entry.

The chorioallantons may show a higher titer of infection for mice (10_7) than the embryo liver and the cerebrum of infected guinea pigs (resp. 10_4 and 10_4).

"The egg-membrane technique is also suitable to the titration of rickettsiae-containing material, but the titers found in this way are smaller than those for mice.

"The sera of eight infected embryos were tested on agglutinins for proteus OX Kingbury and OX₁₉—eight to fourteen days after the inoculation—with negative result.

With the aid of the egg-membrane technique the Sumatran mite fever rickettsiae cannot be distinguished from scrub typhus rickettsiae. This supports the opinion that the germs of these diseases are identical.

TORRINO (Norman H.) Rocky Mountain Spotted Fever. A Note on Some Aspects of its Epidemiology—*Public Health Rep.* 1941 Aug. 22. Vol. 56 No. 34 pp. 1699-1703. With 1 fig.

This paper is of interest because it fully succeeds in its obvious purpose to dispose of the widespread misconception that Rocky

Mountain spotted fever is a less virulent disease in the eastern than in the western States of the U.S.A. The author shows that when the incidence of the disease in different age groups is taken into account the case mortality is as high in Maryland and Virginia as in Montana and Idaho. [It is generally stated in text-books that the Montana type is much more fatal than the Idaho type and this is true in so far as from parts of Western Montana fatality rates of 70-80 per cent and from parts of Idaho of only 5 per cent have been recorded. Figures quoted by the author however show that the fatality rates in these two States each as a whole were 24.0 in Montana and 34.4 in Idaho over a 10 year period.]

The percentage of incidence is much higher among children in the east than in the west while among males of 40 years and over it is much higher in the west than in the east. This striking difference in incidence seems to be explained by variations in the degree to which persons of different age and sex groups are exposed to bite by infected ticks in the areas concerned.

Great variations are shown to occur in the virulence of the infection both in the eastern and western States.

Till recently the eastern strains which had been isolated had been of low virulence to guinea-pigs causing little mortality and no consistent scrotal reactions but in 1940 the author reported a case from Virginia of a patient who was not critically ill from whom a strain was isolated which caused a mortality of 80 per cent. and typical scrotal reactions in guinea-pigs. More recently two highly virulent strains were isolated from patients in Georgia. In 1940 a mild strain was isolated from a patient in Colorado a western State this caused a mortality of only 4.4 per cent. and no consistent scrotal reactions in guinea-pigs.

It has therefore been shown that in both the eastern and western States the strains of *Rickettsiae* may be very mild or very virulent whether judged by animal experiments or by fatalities in human beings.

J W D M

LILLIE (R. D.) *Pathology of Rocky Mountain Spotted Fever* I. The Pathology of Rocky Mountain Spotted Fever II The Pathologic Histology of Rocky Mountain Spotted Fever in the Rhesus Monkey *Macaca mulatta*—*Nat Inst Health Bull No 177* Wash. pp vi+59 With 36 figs on 25 plates [17 refs]

Part I of this bulletin contains an account of the gross and microscopical anatomy of Rocky Mountain spotted fever. The findings in 19 autopsies are summarized and brief notes are given of all the previous records which bear on the subject.

It is quite impossible to give an adequate summary of the closely packed information contained in the 27 pages of the bulletin those who are interested must see the original report which, taken in conjunction with the beautifully illustrated article by WOLBACH in the *Journal of Medical Research* [1919 Vol. 41 p 1 this *Bulletin* 1920 Vol. 16 p 420] contains everything of importance that is known of the subject.

From the brief clinical notes it appears that there was a clear history of bites by one or more ticks in 7 of the 19 cases reported of handling ticks from dogs or the clothing in 4 no mention is made of ticks in the remaining 8 cases.

(March 1942)

The Weil-Felix reaction was positive in dilutions ranging from 1-40 to 1-5 120 in 8 cases, "positive" in 1 negative on the 5th and 10th days, respectively in 2, and was not mentioned in the other 7 cases. In one case the Weil-Felix was negative on the 11th day and positive 1-1,280 on the 14th day in another it was negative on the 14th day and positive 1-1,280 on the 19th day. [The strain of Proteus used is not mentioned.]

Death occurred after 7 to 10 days of illness in 6 cases, after 11 to 13 days in 8 and after 15 to 24 days in 5.

When death occurred before the 10th day there were only vague signs of rash in the dead body. In persons who died after 10 days a petechial eruption was evident. Jaundice was seen in 3 cases. Petechial eruptions of the serous membranes especially of the visceral pleura, were seen in 6 cases. The lungs were slightly affected in persons who died early in the course of the disease. In the later cases there were usually congestion, pleural effusion and areas of consolidation. Purpuric foci were often seen in the mucous membranes of the stomach or intestines. The spleen was enlarged, to a greater degree when death occurred early. Its colour was deep purplish-red. Haemorrhages were seen in the testes of one juvenile case and congestion of the epididymes in another. Cerebral congestion and injection of the meninges were seen in 13 out of 15 cases.

Some of the microscopical changes were as follows.—In the skin every case had numerous perivascular foci of lymphocytic infiltration. There was swelling of the capillary endothelium in 10 and concentric proliferation in 7 of 14 cases. Usually both of these lesions occurred simultaneously. Thrombosis of the arterioles and venules was found only in 4 cases.

Rickettsiae were found in varying numbers in the vascular endothelial cells in most of the cases in which the examination was made in favourable conditions.

Focal lesions were found throughout the brain in all cases fatal after the 12th day but only occasionally in the earlier fatal cases. The brain lesions were of the same type as those of the skin, but in about half of the cases there were perivascular haemorrhages. Infants were found in the small vessels in all cases fatal after the 11th day. The lesions were essentially similar in cases of the eastern and western types.

Part II deals with the findings in 26 autopsies made on rhesus monkeys. The lesions were very similar to those in human beings. Brain involvement was less frequent and there were other minor differences. Both parts of the bulletin are well illustrated with excellent reproductions of photomicrographs.

J W D U

HUTTOX (Jack G.) Rocky Mountain Spotted Fever.—*Jl Amer Med Assoc* 1941 Aug 9 Vol 117 No 8 pp 413-416

This is a good clinical account of the disease. Only a few points call for special notice. One is that— not infrequently the site of the bite (by a tick) cannot be found. This is a matter of practical importance because it is sometimes held that absence of positive evidence of tick bite is strong evidence against a diagnosis of tick-borne typhus.

The case mortality rates of the eastern and western types of the disease are reported to be 18.1 per cent. and 19.4 per cent. respectively the only difference between the two types is that the vectors are not the same.

Convalescent serum is stated to have shown no definite specificity in treatment. Codeine is said to be the drug of choice in treatment of restlessness and insomnia.

J W D M

CASANEDA (M. Ruiz) & SILVA (Roberto) Immunological Relationship between Spotted Fever and Exanthematic Typhus.—*Jl Immunology* 1941 Sept. Vol. 42. No 1 pp 1-14

Gumepigs which had recovered from inoculation with the viruses of epidemic and murine typhus fever showed a high degree of resistance to virulent strains of virus of the Rocky Mountain spotted fever.

In the course of transfers of the spotted fever virus through gumepigs which had recovered from orchitic (murine) typhus only 1 of 24 died whereas 8 of 10 control animals died. So also 4 of 19 animals which had recovered from inoculations with the virus of epidemic typhus died against a death rate of 90 per cent. in controls. A few animals which had recovered from spotted fever infection showed a considerable degree of protection against epidemic and murine typhus viruses.

Sera from 7 cases of Rocky Mountain spotted fever were tested for agglutination against *Proteus X19* and *R. prowazeki*. 6 were positive to the former and all 7 to the latter. Sera from gumepigs infected with spotted fever showed a higher degree of opsonic power against *R. prowazeki* than normal animals but not nearly so high as the sera of animals infected with epidemic typhus.

The conclusion reached was that there is a definite immunological overlapping between spotted fever and typhus infection.

J W D M

DE MAGALHÃES (Octavio) Tifo exantemático em Minas Geraes. Pesquisas de Laboratorio [Laboratory Findings in the Typhus Fever of Minas Geraes].—*Arquivos do Inst Biol* Buenos Aires. 1940 Vol 11 pp 203-214 French summary (10 lines)

Details are given of the results of examinations of the blood, urine and cerebrospinal fluid in a considerable number of cases of typhus fever of Minas Geraes (tick borne typhus).

Some of the more important findings are as follows —

In 71.4 per cent there was leucocytosis leucopenia was quite exceptional. In one case the leucocytes increased from 7,400 to 59,800 within 48 hours. In the early stages the chief increase was in the neutrophils, later the monocytes showed the greatest increase and later still the lymphocytes. There was a striking diminution or complete absence of the eosinophils and basophils in more than 95 per cent. of the cases. There was a slight degree of anaemia with a high colour index in most of the cases but on one occasion a total red cell count of about 10,000,000 was recorded.

In severe attacks the blood urea was always high in one case it was 205 milligrammes per cent. and it was never less than 39 milligrammes.

In mild attacks there was little or no increase in the blood urea. Acidosis was pronounced the acetone index was high indicating an early tendency to hepatic insufficiency.

The urine was scanty and contained traces or moderate amounts of albumin with tube casts in most of the cases. Urea was diminished in 80 per cent and there was chloride retention in 99 per cent. Red blood corpuscles were found in the urine in more than half of the cases.

The cerebrospinal fluid usually showed an increase in albumen globulins and lymphocytes, and in 22 out of 30 cases red blood corpuscles were found.

J W D M

DR MAGALHÃES (Octavio) The Diagnosis of Exanthematous Typhus of Brazil in Minas Geraes.—*Jl Trop Med & Hyg* 1941 Oct. 15 Vol. 44 No 20 pp 134-139 With 3 figs.

Three fatal cases are described of a fever variously designated in the article as exanthematous typhus of Brazil, "exanthematous fever and exanthematous typhus of Minas Geraes."

In these cases a reliable diagnosis would have been impossible on clinical grounds or even after a post-mortem examination, but was easily made by intrapentoneal inoculation of the blood into guinea-pigs. The animals responded with typical fever and scrotal reaction.

In the discussion the author states that he has carried out this test on guinea-pigs and rhesus monkeys in 110 cases of the disease with only one failure and thus resulted from the lateness of the stage at which the blood was taken.

He also states that he has never seen a case in which a similar reaction has followed the application of the test to any other fever.

He claims that a negative response in guinea-pigs or rhesus monkey "dismisses the hypothesis of exanthematous typhus of Minas Geraes."

Apparently no cases were seen in which inoculated guinea-pigs showed mild, non-orchitic reactions such as have been recorded not infrequently in the Rocky Mountain spotted fever whose virus is now regarded as being indistinguishable from that of the typhus fever of Minas Geraes.

J W D M

GEAR (James) & DE MEILLON (Botha) The Hereditary Transmission of the Rickettsiae of Tick Bite Fever through the Common Dog-Tick, *Hemaphysalis leachi*.—*South African Med. Jl* 1941 Oct. 11 Vol. 15 No 19 pp 389-392 With 2 figs.

In two series of experiments hereditary transmission of the Rickettsiae of tick-bite fever (*South African tick-borne typhus*) through the eggs of *Hemaphysalis leachi* to the 3rd and 4th generations was demonstrated.

It was presumed that transmission might continue through indefinite number of generations. Larval, nymphal and adult ticks were found to be infective. Nymphs transmitted infection up to age of 5 months. It was concluded that the tick might act as a reservoir of infection for indefinite periods of time and might man at any stage of its life.

J W D M

VEINTENILLAS (Félix) La vacunación del Tifus altiplánico mediante el antígeno murino mexicano [Vaccination against Altiplanic Typhus Fever by Murine Virus.]—*Suplemento d Inst Nac Bact La Paz Bolivia* 1941 June. pp 6-39 With 11 figs. English summary

[The name altiplanic typhus means typhus of high altitudes it has been applied to the louse-borne typhus of Bolivia by the author who justifies its use by stating that it conforms to the nomenclature of the League of Nations since 1936.]

Several series of experiments on guineapigs and human volunteers are reported following are some of the conclusions—

(1) No cross immunity exists between the virus of altiplanic typhus and the virus of Rocky Mountain spotted fever

(2) Blanc's live murine vaccine did not produce satisfactory immunity against altiplanic typhus in guineapigs and human beings. Of 8 volunteers who were vaccinated with this virus 4 were found to be susceptible to inoculation with the virus of louse-borne typhus while the other 4 who were immune had been under treatment for espuandia with a special preparation containing iodine and tartar emetic the author suspects that they owed their immunity to these drugs.

(3) *Triatoma infestans* can transmit the virus of epidemic typhus in laboratory conditions but no reference is made to the experiments on which this statement is based

(4) Large doses of killed murine virus prepared by CASTANEDA from the lungs of infected rats or white mice gave a sound immunity against altiplanic virus both in guineapigs and in 10 human volunteers. Three doses of the virus were given at weekly intervals small doses gave incomplete protection to guineapigs

Two sets of field trials of the vaccine were carried out in the first of these about 1 000 persons were given two relatively small doses during an epidemic of typhus fever 55 were attacked 14 after the first dose and 42 after the second.

In the second trial large doses were given to more than half the members of a community of 400 persons living in an area where typhus fever had not been known to occur so that the results will not be known till the disease occurs in the locality. Rather severe reactions were reported in a number of the cases after the second dose of the vaccine and police intervention had to be sought before the subjects could be persuaded to receive the third dose

The author expresses his satisfaction at the solution of the problem of anti typhus vaccination and makes an eloquent appeal for greater facilities for the production of the vaccine on a large scale

J W D M

HUDSON (N Paul) Protection of Guinea Pigs against Mexican Typhus Virus by Vaccine from Infected Rat Lungs (Castaneda)—*Proc Soc Experim Biol & Med* 1940 Oct. Vol. 45 No 1 pp 40-43 With 1 chart

Ten guineapigs were inoculated by Castaneda's method with varying doses of phenol killed Rickettsiae of the L Mexican strain obtained from the lungs of infected white rats. Eleven days later the animals were inoculated with large doses of live Rickettsiae of the same strain

one died of an intercurrent infection, the other 9 had neither fever nor scrotal reaction. Four control animals were given doses of live *Rickettsiae* half as large, all had fever and scrotal reactions.

Small single doses of the vaccine (0.2 cc.) seemed to give as much protection as large repeated doses (up to 1.0 cc. repeated four times at intervals of five days)

J W D M

MACKEL (J. F.) Ueber Fünftagefieber (Wolhynisches Fieber) Symptomatologie und Heilung mit Ebasinum. (Five-Day Fever (Wolhynian Fever) Symptomatology and Treatment with Ebasinum.)—*Klin. Woch.* 1941 July 12 Vol. 20. No. 28 PP 711-714 With 2 figs.

The article deals with four cases of fever which were promptly cured by intravenous injections of sulphapyridine (ebasinum).

The cases were diagnosed as trench fever but as will be seen later the evidence on which the diagnosis was based is not convincing. One case is described in detail—the patient had returned from Poland four months before the onset. He had never been found on him nor on any of his associates. He had 19 spells of fever which came at regular intervals of three days except on two occasions when the periodicity was of the four-day type. One of the spells lasted 24 hours all the others were of 12 to 14 hours duration. The chief symptoms were severe headache, hyperaesthesia of the skin and severe pains, which at first were localized chiefly in the hip joints and lower abdomen but later extended to the other joints. All the symptoms disappeared during the intermissions of the fever so that the patient could go for long walks.

Malaria was excluded by the failure to find parasites and by the absence of response to quinine. [No mention is made of the dosage of quinine or of any test to exclude the possibility of evasion of the drug by the patient.]

The leucocyte count was 5 000 to 8 000 during the intermissions but reached a figure of 20 000 at the height of the fever. A fleeting rash was seen after three of the spells of fever on the forearms this was like a painful erythema nodosum on the abdomen it was roseolar.

On the day of the last spell of fever and the following four days the patient was given intravenous injections of ebasinum in doses of one gramme twice daily. After a temporary exacerbation the symptoms disappeared and the patient was fit for duty within three weeks of the first injection.

Very brief details are given of the other cases—one patient had five spells of fever another had six—the periodicity was of the three-day type except on one occasion when it was of the four-day type in one of the cases. There were severe pains, chiefly in the wrists and ankles, during the paroxysms of fever. There was no rash.

The fourth patient had symptoms suggestive of rheumatic polyarthritis. No mention is made of the number of spells of fever or of the periodicity but the latter must have been tertian because in the discussion it is stated that this type of fever occurred in one of the cases. Ebasinum given once daily in doses of one gramme dissolved in 10 cc. of normal saline by the intravenous route effected a prompt and lasting cure in the last three cases. Three doses were given in one case four in the other two.

The author bases the diagnosis of trench fever on the recurring spells of fever with severe pains in the joints on the exclusion of malaria and the absence of evidence of sepsis. He suggests a trial of eubasium in other rickettsial infections and in protozoal fevers.

[In view of the rarity of tertian and quartan fever in diseases other than malaria, fuller details would have been expected of steps to exclude malaria. The response to sulphapyridine is in keeping with a diagnosis of malaria. CHOPRA and his co-workers have recently shown that this drug may be effective in all forms of the disease (this *Bulletin* 1940 Vol. 37 p 503).

Even if the statement is accepted that malaria was easily excluded there are serious objections to the diagnosis of trench fever. Since 1918 this disease has been so rare that the occurrence of four unconnected cases would be remarkable. In the absence of any evidence of louse-infestation of the patients or their associates it would be almost incredible. Also the periodicity of these attacks is quite different from that described as characteristic of the relapsing form of trench fever in which it was of the five or six day type as opposed to the two or three exceptionally four day type reported in the present series.

The names *febris quintana* and *Rickettsia quintana* may have been responsible for some confusion, on the analogy with malaria these suggest a periodicity of four days instead of the prevailing five or six day type.

The reviewer does not exclude the possible occurrence of a non malarial quartan fever. He once saw a case of persistent quartan fever in Calcutta in which no parasites were found after repeated search by the late Lt-Col KNOWLES. Quinine in doses of 10 grains thrice daily for several days failed to control the fever but a single injection of neosalvarsan effected a prompt and lasting cure.

Unfortunately animal inoculations were not carried out in this case nor in any of the cases under review. Their features suggest the possibility that the virus may have been a spirochaete.

Drugs of the sulphanilamide type will doubtless be tried in spirochaetal and rickettsial fevers. The results will be of great interest.]

J W D M

WERNER (H) Ueber die Rickettsien des Fünftagesiebers [The Rickettsiae of Trench Fever]—*Archivos do Inst Biol* Buenos Aires 1940 Vol 11 pp 601-605

In a historical review of trench fever the author refers to OGATA's success in cultivating *Rickettsia quintana* in the testicles of guinea-pigs and to the same worker's use of the cultivated virus in the treatment of cerebral syphilis, a procedure first suggested by the author himself. Werner holds that *R. quintana* is preferable to malaria parasites as a therapeutic agent in the following two respects (1) freedom from risk to life (2) avoidance of the necessity for treatment of the infection.

Any risk of spreading infection by the virus can easily be obviated by simple precautions.

J W D M

ANDERSON (W M E) Clinical Observations on Sandfly Fever in the Peshawar District.—*Jl Roy Army Med Corps* 1941 Nov Vol 77 No 5 pp 225-239 With 1 fig [10 refs]

The most interesting feature of this report is that it contains an account of an attempt to diagnose sandfly fever by making cultures of

the virus in the chorio-allantoic membranes of chick embryos, by means of the technique introduced by SHORTT [See this *Bulletin* 1939 Vol. 36 p. 483 1940 Vol. 37 pp 273 853 1941 Vol. 38, p. 208.]

During 1938-1939 samples of serum were taken from 132 patients suspected of having sandfly fever as far as possible the specimens were collected on the first day of the fever

A portion of each sample was dried and sent to the King Institute, Guindy in most cases a portion was also examined by Shortt's technique at Peshawar The sera were stored in a refrigerator sometimes for several weeks before inoculation the specimens sent to Guindy went by post at the hottest time of the year and took five days in transit

The combined results of the inoculations were positive cultures in 78 doubtful in 14 and negative in 40

Subsequent reconsideration by the author of the 54 doubtful and negative cases enabled him to exclude nine on the grounds of error in diagnosis in 28 others it was thought that the fever might have been caused by influenza (four cases) the combined effects of chill and indiscretions in diet (11 cases) or the effects of heat (11 cases) The remaining 19 patients were considered to have had sandfly fever and of these seven had given doubtful, and 11 negative responses to the cultural test.

The explanation suggested for these failures was— for some reason not clearly understood the virus did not produce definite lesions or failed to remain viable on storage

[The report shows that in conditions such as are described, little importance can be attached to negative findings.]

The signs and symptoms observed in the 78 positive cases are described these were of the usual type but secondary rises of temperature occurring at least 24 hours after the end of the first phase and lasting 12 to 24 hours were seen in 9 cases

Reference is also made to five cases resulting from the inoculation of blood from patients into volunteers the incubation period was 6 to 10 days and a secondary rise occurred in one case. J W D M

JMáñez (José F) Carrion's Disease. I. Some Growth Factors Necessary for Cultivation of *Bartonella bacilliformis*.—*Proc. Soc. Experim. Biol. & Med.* 1940 Oct Vol 45 No 1 pp. 402-405 [10 refs] [Summary appears also in *Bulletin of Hygiene*]

Hitherto Noguchi's semi-solid serum agar medium designed for cultivation of leptospira has been used for *Bartonella bacilliformis*. Growth could not be obtained on solid media without addition of blood. The author set out to determine whether x or v growth factor or both were necessary. An aqueous extract of yeast, prepared by Lwoff's method was the source of the v factor and was used in a proportion of 0.1 per cent in 1 per cent glycerine infusion agar. For the x factor 5 per cent defibrinated rabbit's blood was added to the medium. Agar plates containing these factors separately and together were inoculated with four strains of *Bartonella bacilliformis* and incubated at 25-28°C. the pH of the medium was 7.2-7.6. Growth ceased if the medium became dry so the plates were sealed with rubber.

Small translucent colonies were visible to the unaided eye by the third or fourth day on the third if both x and v were present in the

glycerine agar on the fourth or later if x factor alone were present there was no growth if v alone was present. It would seem therefore that the organism can produce its own cozymase but cannot synthesize the x factor.

Other solid media were tried with success two are specially mentioned.

1. *Blood glucose-cystine agar* made by adding 0.1 per cent cystine and 1 per cent glucose to autoclaved beef infusion agar and sterilizing in flowing steam for an hour on two days. Before the plates are poured fresh defibrinated rabbit's blood is added to 5 per cent. Colonies were numerous discrete and clearly visible by the third day.

2. *Defibrinated rabbit's blood infusion agar with 1 per cent glycerine* also gave abundant growth by the third day.

A four or five-day growth on any of these was equivalent to a 15- to 20-day-old culture on Noguchi's leptospira medium.

Macroscopically two types of colony were observed (1) Small round mucoid clear colonies sometimes becoming confluent and adhering to the medium (2) Opaque finely granular but mucoid film also adherent to the medium. Microscopically there was considerable pleomorphism some being finely granular and in masses others as small bacillary forms.

H H S

DEL PONTE (Eduardo) La verruga peruana o enfermedad de Carrion — *Crónica Méd Lima*. 1941 Apr Vol. 58 No 834 pp 100-106.

CHOLERA

LAL (R. B.) RAJA (K. C. K. E.) SATYA SWAROOP BASAK (K. C.) Statistical Inquiry into the Epidemiology of Cholera in Bengal Part I. A General Review of the Epidemiological Features of Cholera in Different Parts of Bengal [LAL RAJA & SATYA SWAROOP] — *Indian J Med Res* 1941 July Vol. 29 No 3 pp 425-440 With 4 maps. Part II. Formation of Homogeneous Cholera Districts [LAL, RAJA, SATYA SWAROOP & BASAK] — *Ibid* pp 441-463 With 8 maps. Part III. Endemicity and Epidemicity of the Homogeneous Cholera Districts [SATYA SWAROOP RAJA LAL & BASAK] — *Ibid* pp 465-482. With 1 map.

Part I — The well known recognition of Bengal as the endemic home for cholera in India forms the first statement in this communication. Reference is also made to the belief that epidemics originating from Bengal have occasioned pandemics involving the greater part of the inhabited globe.

It is to the extensive area comprising Assam Bengal and Orissa that the authors devote their attention as one, and indeed the chief endemic centre of cholera. The area in question covers 146 000 square miles and naturally it is asked whether this huge area is homogeneous in composition and whether any heterogeneity present is correlated with obscure points in the epidemiology of cholera. Unfortunately the only data, although probably the most reliable of

the data available for statistical study are the cholera mortality figures. The districts of Bengal were classified on the basis of a mean cholera rate for the whole province of 1.92 per mille into (1) those of low mortality rates, 0 to 0.96 (2) moderate rates, 0.96 to 1.92, (3) high rates 1.92 to 2.88 and (4) very high rates 2.88 and over. In the summary of the statistical findings it is stated that (1) "The districts of Bengal present considerable heterogeneity in regard to their cholera experience and that there are evidences of heterogeneity within the districts themselves (2) The necessity of undertaking an inquiry with a view to forming homogeneous cholera districts in connection with the study of the natural history of the disease" has become obvious.

Part II—In the attempt to sort out homogeneous cholera districts the *thanas* and especially contiguous *thanas* are selected as the units for determination of numerical similarity. The cholera experience in this type of investigation is set out in terms of (1) the mean incidence and (2) the variability of incidence round the mean. Demonstration of this experience is on strictly statistical lines and there is excellent pictorial presentation of the results in a series of 8 maps. Three variables are involved in the statistical analysis. These are described, for variability of cholera incidence as seasonal, yearly and residual. What may be stated as conclusion is as follows. It is believed that the re-distribution of the area into homogeneous cholera districts gives a basis for investigation of the underlying factors in the natural history of cholera which are responsible for the observed variations.

Part III—With the field of investigation thus cleared by definition and enquiry the authors proceed to test the endemicity and epidemicity of their homogeneous cholera districts again by well recognized statistical procedure. A frequency distribution of varying intervals of absence of cholera has been worked out for each *thana* individually and for the *thanas* constituting each homogeneous district collectively. The net endemicity determined by the method of partial regression to eliminate factors such as differences in population area and the number of *thanas* to a district has been used to classify the homogeneous districts into endemic and non-endemic. The epidemic and endemic characters of various homogeneous cholera districts of south-west Bengal have been defined.

II F Harvey

ORISSA ANNUAL PUBLIC HEALTH REPORT FOR YEAR 1939 AND ANNUAL VACCINATION REPORT FOR YEAR 1939-40 [VERGHESE (G.) Director] [Cholera pp 6-7 With 1 folding chart. Fairs and Festivals pp. 10-12]

There is little doubt that 1939 was an epidemic cholera year in the province of Orissa. Thus the total deaths from cholera during the year were 11 141 as compared with 1,309 in 1938. It was the coastal deltaic districts which suffered most and these are the districts which in great measure remain submerged during the rains. If infection starts in a village it is difficult to control before it reaches epidemic proportions. Practically all the main sources of drinking water supply are open to gross contamination. The usual preventive methods of inoculation and disinfection of water sources excreta and belongings are always adopted. It would seem however that for permanence of effect steps should be taken for provision of pure drinking water.

by sinking large numbers of deep masonry wells in preference to other sources and means of supply. Otherwise all money spent to take temporary preventive measures by the appointment of additional staff purchase of medicines disinfectants vaccines etc. will be a mere waste as it has been in the past. Fairs and festivals are noted for outbreaks of cholera and the famous Jagannath temple attracts pilgrims in large number from all over India. The most famous and important of the pilgrim *melas* are the Snan the Car and the Return Car festivals held in Puri. These were attended by about 45 000 65 000 and 70 000 pilgrims respectively. *W F H*

POLLITZER (R.) YAO (H Y) LAI (D G) & CHEN (S K.) The 1939 Cholera Epidemic in Yunnan Province with Special Reference to Kunming City.—*Chinese Med J* 1941 May Vol 59 No 5 pp 457-467. With 2 maps & 2 charts.

The 1939 cholera epidemic which broke out in Kunming the capital of Yunnan Province was traced initially to two chauffeurs arriving there from Kweichow on July 15th. In the succeeding 5 months 3 486 cases with 2 515 deaths were reported in the province and 436 of these cases occurred in Kunming City. Investigation was made of water supply food and drinks and the contact between cases. Several causes were incriminated as responsible for the spread of the epidemic in the city. Statistics collected to determine the value of inoculation showed 16 cases in the inoculated group of 80 000 as compared with 308 cases in the non inoculated population of about 120 000.

W F H

KUBOTA (K.) The 1939 Asiatic Cholera Epidemic in Kwangchow Shih.—*Taiwan Igakka Zasshi (Jl Med Assoc Formosa)* 1941 June. Vol 40 No 6 [In Japanese pp 1070-1097. With 2 charts. [22 refs.] English summary p 1097.]

The English summary refers briefly to an outbreak of cholera in Canton from May to October 1939 during which there were 214 cases with 110 deaths. Eight carriers were detected but information as to what constitutes a carrier is not given in the summary. *C W*

SANYAL (S N) The Epidemiology of Cholera. A New Conception.—*Calcutta Med. Jl* 1941 July Vol 38 No 7 pp 349-360. With 7 graphs. [25 refs.]

READ (W D B) & PANDIT (S R.) Distribution of *V cholerae* and El Tor Type Strains in Certain Rural Areas in India.—*Indian Jl Med Res* 1941 July Vol 29 No 3 pp 403-418. With 1 sketch & 1 diagram.

Active investigations are being carried on especially in British India, into the specific characterization of the cholera and El Tor vibrios. This communication takes up the question from the point of view of the distribution of the agglutinable vibrio throughout an

entire year "in the general population and water sources of a rural area in one of the endemic cholera districts of the delta of Bengal." Control investigations are included, representing (1) an "epidemic" area in Bihar and (2) a non-cholera area in Sind. The term agglutinable vibrio is used throughout to designate a strain agglutinable with pure O serum of O group I (Gardner and Venkatraman 1935) including sub-types Inaba and Ogawa. Some of the details of the persistence of the non-haemolytic and the occurrence of the haemolytic agglutinable vibrio are highly important. The general findings set out the main points of evidence and some tentative conclusions.

"The non-haemolytic agglutinable vibrio was found in all except one of the clinical cases in areas where the presence of cholera could be established. About 7 per cent. of close contacts of cholera proved positive and about 16 per cent. of water sources in direct contact with cases were positive."

Carriage of the cholera vibrio whether by case contact case or water supply seems to have been only of short duration. "There was no evidence of persistence in any source much over one fortnight. On the other hand the non-haemolytic vibrio with one or possibly two exceptions was not found in the absence of the disease. El Tor vibrios have been found by the authors."

The haemolytic agglutinable vibrio while detected in the presence of the disease has been found usually in its absence. It has been found in cholera areas of two different epidemiological types in different provinces of India and in relatively large numbers in an area which must be taken as not only free from cholera during the period of investigation but free from cholera during the decade previous. The findings in these respects so far are out of line with those described in Celebes Islands."

The authors themselves issue a cautionary note regarding too great generalization of these findings and the technical difficulties of isolation of small numbers of the agglutinable vibrios from natural sources.

W F H

VENKATRAMAN (H. V.) KRISHNASWAMI (A. H.) & RAMAKRISHNAN (C. S.) Occurrence of Vibrio El Tor in Natural Sources of Water in the Absence of Cholera.—*Indian J Med Res* 1941 July Vol. 29 No. 3. pp 419-424

A close relationship between the occurrence of a haemolytic agglutinable vibrio that is to say an El Tor vibrio and its causal relationship to an epidemic of cholera in the Celebes island of the Netherlands Indies has greatly stimulated the renewal of interest in the significance of this vibrio. The authors in this communication place on record "the repeated finding of vibrio El Tor in open natural water sources in South India in the complete absence of cholera in the region."

This finding was based not only on notifications of cholera but also on the examination of 1,827 stool specimens from the inhabitants of the districts "and 237 natural sources of water. It is summarized in the statement "The isolation of haemolytic agglutinable vibrios (vibrio El Tor) from 15 open natural water sources in two rural areas in the absence of cholera is recorded."

The isolation of "non-haemolytic agglutinable vibrios indistinguishable from true *V. cholerae* from "two other sources in the same area is also worth noting.

W F H

GUINDY REPORT OF THE KING INSTITUTE FOR THE PERIOD FROM 1ST OCTOBER 1939 TO 30TH SEPTEMBER 1940 pp 32-34 —Madras Cholera (Field) Enquiry [VENKATRAMAN (K V) under the Director, King Institute Guindy]

Examination of 761 specimens of water from 230 sources (mostly tanks) yielded agglutinable vibrios in 21 specimens 13 of which were of Ogawa and eight of Inaba type Twenty of these strains were haemolytic on first isolation but there were considerable variations in haemolytic property on later examination If examinations were repeated the type of vibrios remained the same Cholera vibrios in 2 per cent. salt solution containing 1/50 000 peptone with a pH initially of 9.2 survived for as long as 198 days and still retained their original smooth and agglutinable character Work was carried out to discover a preservative for stool specimens collected at a distance for despatch to the laboratory The best of these was a boric acid-potassium chloride-buffer saline with the help of which the pH of the stool could be maintained for a considerable time In one case the cholera vibrio could be recovered from the preserved stool for 21 days

W F H

SHILLONG KING EDWARD VII MEMORIAL PASTEUR INSTITUTE AND MEDICAL RESEARCH INSTITUTE TWENTY THIRD ANNUAL REPORT FOR YEAR ENDING 31ST DECEMBER 1939 [ANDERSON (L V P) Director] pp 5-7 —Cholera Enquiry under the Indian Research Fund Association

Experiments were carried out on the reversion of water vibrios to true cholera vibrios The basis of this investigation was the idea that some water vibrios occurring in nature might have been produced from the cholera vibrio by the action of bacteriophage If their bacteriophage resistance could be removed it seemed possible that they would revert to the cholera vibrio The removal was attempted by growing water vibrio strains in the presence of appropriate antiphage sera but the reactions of the vibrios were not changed by this procedure

W F H

GOHAR (M A.) The Bacteriostatic, Bactericidal and Possible Chemotherapeutic Properties of Potassium Tellurite with Special Reference to a Method for the Isolation of the Cholera Vibrio —*Jl Trop Med & Hyg* 1941 Aug 1 & 15 Vol 44 Nos 15 & 16 pp 96-99 106-107

The differential effect of potassium tellurite on groups of organisms has been used to inhibit the growth of certain bacteria in culture media while permitting that of others In the present study its bacteriostatic and bactericidal action in varying dilutions has been determined in the presence and absence of serum and its usefulness for the isolation of the comparatively resistant cholera vibrio The best method for this latter purpose was to inoculate ordinary alkaline peptone water containing 1 in 1 000 000 pot tellurite with the cholera stools incubate 8 to 10 hours at 37 C and plate out on Vedder and Van Dam's medium containing 1 per cent haemoglobin and 0.12 per cent glycerol The bacteriostatic action of pot tellurite is only slightly interfered with but its bactericidal action is greatly interfered with in the presence of serum

The proven sensitiveness to pot. tellurite of members of the *Bacterium* group of organisms suggested its trial as a therapeutic agent. A suggestion is also made that substitution of tellurium for sulphur in sulphonamides might furnish a preparation especially effective against the *Bacterium* group. The *in vivo* effect of potassium tellurite alone and in combination with dyes which are known to possess either a bacteriostatic or a bactericidal effect or both on *B. coli* was tested. It was found that 0.0001 gm. potassium tellurite when injected intravenously into rabbits immediately after infection was enough to save 50 per cent. of the animals. It had little effect on *Past. bovis* infection. W F H

[The tellurites are intensely poisonous. KRAMER (*Bull. of Hyg.*, 1942, Vol. 17, p. 189) records a case of a laboratory worker who accidentally swallowed about 1 cc. of a 1 per cent. solution and was seriously ill for a long time with diarrhoea, blood changes and osteitis of the jaw. Other cases have been reported and it is noted that at one time tellurium was used in the treatment of syphilis with good effect, but had to be abandoned.—Ed.]

PASRICHA (C. L.) LAHIRI (M. N.) & DE MONTY (A. J. H.) A Further Type of Cholera phage—Type N.—*Indian Med. Gaz.* 1941 Apr. Vol. 76 No. 4 pp. 218-219

Types A to M cholera phage have so far been isolated. BRUCE WHITE however obtained a strain from type L differing from the original type and he named it LL. It was found that egg-white lysozyme greatly enhanced the activity of this phage. The use of lysozyme enabled White to show that 15 Indian strains of *Vibrio cholerae* examined by him were infected with LL phage, whereas 10 Chinese and Japanese strains of *V. cholerae* proved free of LL phage and were sensitive to its action. The present authors have purified a set of A to M cholera phages from contaminating phage by propagation and plaque isolation on a Japanese Inaba strain of *V. cholerae* which was known to be free from any contaminating LL phage. With the application of a reciprocal cross test it was found that the LL phage behaved as a new type. It must therefore be called N cholera phage. A very important character of the new phage is that it acts on *V. cholerae* alone and not on the maggot-inhabitable vibrios. In this respect it resembles type A and is distinguished from types B to M. W F H

PASRICHA (C. L.) & PAUL (B. M.) Bacteriophages in Soil.—*Indian Med. Gaz.* 1941 July Vol. 76 No. 7 p. 418

This is a brief note to record the many samples of garden and field soil containing bacteriophages against the dysentery bacilli, *Bact. typhosum* and *V. cholerae* in that order of frequency. The phages were found in soil taken at levels down to three feet below the surface. C W

BANKERJEE (D. N.) Hypochloraemia in Cholera.—*Indian Med. Gaz.* 1941 June Vol. 76 No. 6 pp. 345-349 [18 refs.]

The excessive vomiting and diarrhoea of cholera both lead to great loss of chlorides. In a series of cases in which measurements were

made it was found that a loss of 9.7 gm chloride in 24 hours occurred through vomiting and of 34.6 gm by the bowel. These cases were receiving at the same time a fair quantity about 25 gm of chloride daily by intravenous and subcutaneous injection. The result is a marked hypochloraemia with a great alteration in the distribution of electrolytes and in the acid base balance. Both haemoconcentration and hypochloraemia are found in cholera but it is the hypochloraemia which is of more importance in the production of azotaemia than the concentration. The chlorides in the body fluids play a great part in the stabilization of the acid base balance. It is to be expected therefore that this balance would be as it is greatly altered in cholera. If loss of chlorides remains unrestricted the invariable result is dehydration retention of nitrogenous waste products and renal failure.

W F H

BANERJEE (D N) *Capillary Reaction in the Cholera Kidney*—*Jl Indian Med Assoc* 1941 Aug Vol 10 No 11 pp 443-446 With 4 figs [13 refs]

Dehydration and loss of body fluid in cholera produce a fall of systemic blood pressure which has a marked effect on renal function by lowering the pressure in the glomerular capillaries. With this lowering of glomerular pressure there is slow filtration through the glomerulus which allows increased reabsorption in the tubules and further diminution in the quantity of urine. The chief kidney lesion noted in cholera is congestion and this is explained by the author as due to dilatation of interlobular arteries extending to afferent and efferent vessels and the capillaries of the glomerulus itself with consequent stagnation of the circulation. The renal vascular failure in cholera is only a part of the whole systemic peripheral capillary failure. The arterial system is found to be empty while the venous system particularly of the splanchnic area is engorged. This leaves the capillary system stagnant. This capillary failure in the kidney in conjunction with great loss of interstitial fluid and hypochloraemia constitute the mechanism of the renal failure in cholera.

W F H

TOMS (J Walker) *Cholera and Uraemia*.—*Jl Trop Med & Hyg* 1941 July 1 Vol 44 No 13 pp 80-82 [14 refs]

Due consideration is given in this article to the varying views of writers on the subject of uraemia anuria in cholera and collapse. The author's own view is that intravenous saline injections may fail to restore and maintain the circulation in cholera as well as to re-establish the secretion of urine after collapse has existed for two or more hours because the renal capillary endothelium and tubular epithelium have been irreparably damaged by lack of oxygen. This leads to the suggestion that collapse of the circulation however caused being due to tissue asphyxiation should be treated by administration of oxygen after preliminary restoration of the circulation by intravenous salines or by salines with plasma.

W F H

ASHWORTH (Charles T.) & ADAMS (George) Blood Specific Gravity Studies. Relationship of Specific Gravity of Whole Blood to Specific Gravity of Plasma, Red Blood Cell Count, Hematocrit, and Hemoglobin as Indicators of Haemoconcentration.—*Jl Lab. & Clin. Med* 1941 Sept Vol 26 No 12 pp. 1834-1839 With 3 figs

More than one of the tests applied in blood examination are indicators of blood concentration. Some of these are more easily put into execution than others. Some overlap in their indications without being exactly identical. The authors use the specific gravity especially of the whole blood, as their indicator of haemoconcentration. They have worked out experimentally the linear relations between specific gravity of whole blood and haematocrit erythrocyte volume haemoglobin (gm./100 cc.) content and number of erythrocytes. The method of determining specific gravity was that known as the falling drop method (BARBOUR & HAMILTON *Jl Biol Chem* 1926 Vol 69 p 825). Haemoglobin was estimated by means of a photo-electric colorimeter and haematocrit volume with Wintrobe graduated tubes. In the connecting equations the average specific gravity of human erythrocytes is taken as constant at 1.0971 the actual variation in normal individuals being from 1.0936 to 1.0998. In patients with anaemia the variation was somewhat greater from 1.0868 to 1.1045. The specific gravity of erythrocytes was calculated from the equation —

$$S.G. r.b.c. = \frac{(S.G. \text{ whole blood} \times 100) - S.G. \text{ plasma} \times (100 - \text{haematocrit})}{\text{haematocrit volume}}$$

With the average specific gravity of human erythrocytes known, the haematocrit value may be calculated from the specific gravity of whole blood and plasma being equal to $S.G. \text{ whole blood} \times 100 - [S.G. \text{ plasma} \times (100 - \text{haematocrit})] 1.0971$

Although the specific gravity of the whole blood is partly dependent on the S.G. of the plasma it has been found in practice that "the hematocrit, red blood cell count and hemoglobin bear a distinct mathematical relationship to and can be fairly accurately estimated from the specific gravity of the whole blood. The relationship may be expressed as follows —

$$(1) \text{ Haematocrit} = (S.G. \text{ whole blood} - 1.0457) \times 1000 + 32$$

$$(2) \text{ Haemoglobin} = (S.G. \text{ whole blood} - 1.0470) \times 396 + 11$$

$$(3) \text{ R.b.c. count in millions} = (S.G. \text{ whole blood} - 1.0466) \times 14.5 + 3.5$$

In shock, protein concentration or specific gravity of plasma was not found to be a satisfactory indicator of haemoconcentration, since protein is lost from the circulating blood during the course of shock.

W F H

DEMONTE (A. J. H.) & GUPTA (S. K.) Erythrocyte Sedimentation Rate in Cholera.—*Indian Med Gaz* 1941 Apr Vol. 76 No 4 pp. 213-216

Cholera is an acute disease and is regarded by some as an allergic manifestation by others as a toxic manifestation. It was thought that the sedimentation rate might throw some light on the truth of one or other of these hypotheses. Altogether 79 cholera patients were examined. The results showed that acceleration and total fall were greater than normal in 83 of these cases. One factor of importance in

cholera is the increased specific gravity of the blood due to dehydration which itself slows the sedimentation rate and may be a reason why acceleration is not more evident in this disease W F H

RUSSELL (H). Suppression of Urine in Crush Oedema. [Correspondence]—*Lancet* 1941 July 19 p 87

In this letter the author likens the condition in crush oedema to that which occurs in cholera in which there is suppression of urine when the patient collapses because of the huge effusion of fluid from the circulation into the intestine. This suppression is associated with acidosis and the work of SELLARDS in treatment with large intravenous doses of sodium bicarbonate is recalled. In cholera the secretion of urine may be restarted even after suppression lasting for two days. Calcium should be included in the solution and an excess of sodium avoided but alkali must not be given after the urine has become alkaline C W

ALDRIDGE (A G V). A Comparison of the Value of Crystalloid Solutions, Whole Blood and Blood Plasma in the Treatment of Dehydration in Infancy—*Arch Dis in Childhood* 1941 Sept Vol 16 No 87 pp 182-205 With 9 figs. [28 refs]

Treatment of dehydration from whatever cause produced whether from pyloric stenosis and gastroenteritis in children or cholera in the tropics should proceed on much the same lines. Three factors come into play (1) loss of water (2) loss of electrolytes with alteration of the acid base balance of the blood, and (3) the effect which oliguria may play in producing the condition. Treatment takes account of these factors (1) by giving fluid in excess of normal requirements (at least 2½ oz per pound of body weight per day) and (2) parenteral administration of fluid to supplement insufficiency of oral intake by subcutaneous and intravenous routes. The fluids used are normal salt solution and 5 to 10 per cent. glucose in sterile triply-distilled water or in normal salt solution. Moderate dehydration may be dealt with parenterally by the use of normal saline subcutaneously as continuous drip at 10 to 15 cc. per pound of body weight. If dehydration is severe a 5 to 10 per cent. glucose in saline is given intravenously either in simple doses of from 10 to 15 cc per pound of body weight or by continuous drip for 24 to 72 hours. The question also naturally arises of the benefit of transfusion of blood in these cases. The matter is not altogether simple for the state of concentration of the blood in erythrocytes and in salts has to be taken into consideration whether transfusion is to be of whole blood or of plasma only. These questions are discussed in clear detail in the text.

The chief aim in treatment is the replacement of water and salts lost by diarrhoea and vomiting. It is unnecessary to provide specially for loss of bicarbonate because it is the replacement of the sodium ion which is really required. When simple sodium chloride is administered for dehydration the body is able to keep the ion of which it is most in need and provided that renal function is active can excrete the other in the urine. Oliguria and still more anuria, must be relieved and for this purpose the fluid used must not only supply water to the organism but restore the disordered blood chemistry by its diuretic action. For this purpose hypertonic glucose (10 per cent) is most commonly used. There are some objections however to the haphazard use of intravenous glucose. Its diuretic effect may result in

removal of too much chloride with production of tetany or too much water with production of increased dehydration. Then too there are the objections that with the use of a large volume of fluid intravenously the plasma protein may fall considerably and oedema of the intestinal mucosa may lead to increase of the diarrhoea. The principles governing the treatment of dehydration, including those relating to transfusion of blood are sufficiently summarized in the conclusion—

Solution of normal saline should not be used as routine treatment in many instances there is an apparent, if not actual, accumulation of chloride in the blood which may increase if further chloride is administered. The routine use of whole blood is not recommended as in the majority of cases the blood, which is already concentrated becomes even more so as the result of treatment. When considering the use of blood transfusion the haematocrit, and preferably the red cell count and haemoglobin concentration in addition should be estimated. If these are raised above normal the case is unsuitable for transfusion. In those patients in whom the haematocrit shows a marked degree of haemo-concentration and who require more drastic treatment than the administration of crystalloid solutions parenterally transfusions of plasma should be undertaken. W F H

PASRICHA (C L) MALIK (K S) & PAUL (B M) The Sterility and Potency of Injectable Substances. (II) Salines for Intravenous Use.—*Indian Med Gaz* 1941 Apr Vol 76 No 4 pp. 216-218

In recent years evidence has accumulated to show that febrile reactions after intravenous injections of saline solutions are due to pyrogenic substances usually dissolved in the saline used. These are largely split proteins derived from bacteria, commonly present in the air which gain access to and readily multiply in, solutions which are not kept rigidly sterile. Pyrogenic substances may moreover pass over with droplet from water in the act of distillation to the distillate unless the still is provided with arrangements to prevent this.

It is important to avoid water containing pyrogenic substances in the treatment of cholera since there are indications that febrile reactions may counteract the beneficial effects of saline therapy. The authors give in outline certain methods of ensuring pyrogen free distilled water. They tested 12 samples of salines intended for intravenous use and stored in bottles some corked, some with glass stoppers and some with screw caps. In each specimen bacteria were present, chiefly cocci and spore-forming organisms, and in each was found oxidizable matter in comparatively large quantity. It is evident that the storage methods employed were ineffective to prevent contamination but the best is apparently storage in screw-capped bottles. It is pointed out that oxidizable matter may be derived from sterile cotton wool used either as a plug or as a filter. The authors advise that salines for intravenous use should be prepared at a central source of supply by persons skilled in the necessary technique. C H

PASRICHA (C L) ABEDIN (Z) & PAUL (B M) The Sterility and Potency of Injectable Substances. (III) Cholera Vaccines.—*Indian Med Gaz* 1941 June Vol 76 No 6 pp 344-345

The authors have examined 200 samples of cholera vaccine. Of these 34 per cent failed to pass sterility tests 51 per cent were unsatisfactory by the direct agglutination test and only 37 per cent passed

both the sterility and potency tests. Although all were claimed to contain 8 000 million organisms per cc. only 24 per cent corresponded to the Brown's opacity tubes indicating that strength or more. In spite of the known fact that autolysis may occur it is difficult to believe that those samples containing only 2 185 million or less ever contained the stated 8 000 million.

To overcome the difficulty of autolysis the authors desiccated and sealed a thick suspension of *V. cholerae* they find that resuspension in saline is satisfactory and that there is no appreciable loss of opacity during storage. Moreover the antigens appear to be better preserved in the dry state than in suspension. Desiccation is simple and offers great advantages in storage and transport. C II

ERRATUM

Vol 38 No 4 p 212 line 15 *for* Prepare peptone-agar of composition —peptone 40 gm. sod. chloride 80 gm. water 4 000 cc.
read Prepare peptone-agar of composition —peptone 40 gm. sod. chloride 20 gm. agar 80 gm. water 4 000 cc.

LEISHMANIASIS

MCCLELLAND (Henry W H) Notes on an Endemic Centre of Kala-Azar in the Province of Hupeh, Central China.—*Chinese Med J* 1941 July Vol 60 No 1 pp 87-89

The author gives a brief account of 15 cases of kala azar seven of them diagnosed by the discovery of leishmania which came under his notice in Anlu which is situated 70 miles north west of Hankow in the province of Hupeh. There is no doubt from enquiries made that the disease has existed for some time in the district where it is evidently endemic. The cases actually seen came from villages and hamlets at varying distances from Anlu. C M Wemyss

SENERJI (H A) & ZEBOUNI (Nasrat) Biochemical Reactions of the Genus *Leishmania*.—*Amer J Hyg* 1941 Sept Vol 34 No 2. Sect C pp 67-70

The biochemical reactions of a number of strains of leishmania were studied from the point of view of growth on various sugar media thermal death point bile solubility etc. It is claimed that *L. brasiliensis* [the parasite associated with American muco-cutaneous leishmaniasis] is so resistant to bile that 30 per cent of the leptomonads are still alive after seven days whereas *L. infantum* and *L. caninum* are immediately dissolved. There was no evidence of sugar fermentation by the leishmania nor was there any production of indole. The thermal death point was 15-20 minutes at 40°C and immediate at 45°C. All the forms tested are aerobic or facultatively aerobic. Such are some details of the result of the study described in this paper.

C M W

CHENG (Huei-Lan) & LU (J P) Cross Complement Fixation Reaction of the Sera of Kala Azar Patients and the Sera of Dogs and Rabbits Infected with or Immunized against *Leishmania donovani* and *Leishmania canis*.—*Chinese Med J* 1941 Apr Vol. 59 No 4 pp. 301-313 13 refs.

With antigens prepared from the spleens or livers of moles and hamsters experimentally infected with *Leishmania donovani* and *L. canis* complement fixation tests were carried out with the sera from cases of human and canine kala azar in Peiping and with the sera of rabbits injected intravenously with parasites from the spleens of hamsters. From the tests carried out it was clear that the complement fixation test was of definite value for the diagnosis of kala azar and that the parasites used in the experiments were either identical with, or very closely related to one another. This would mean that the human and canine kala azar of N. China are caused by the same parasite.

C. M. W.

IRX (J. G.) Generalized Leishmaniasis in Dogs. Clinical Observations on the Formol-Gel Reaction in Diagnosis and Prognosis.—*Algerie Med* 1938 Mar (Abst from German version in *Berl Mündch Tierärztl Woch* pp 677-681 Note by translator (W. WITTMER) p 681) Summary taken from *J. et Bull* 1941 Dec Vol. 11 No. 12 p 850 Signed L. F. RICHARDSON.

Observations are recorded on the relationship of the formol-gel reaction to the severity of the attack in canine leishmaniasis, and on the effect of treatment on the reaction. The dogs on which the observations were made could be divided into two groups: the first of which was characterized by a slow gelification of the serum such animals improving under treatment. In the second group gelification occurred within a few minutes, the animals showed more or less severe symptoms of disease and failed to respond to treatment.

Treatment consisted in the injection of stiboval, which in the early work was given at a total dose of 84 cg. in three series of six injections spread over a period of two months. This treatment was not always tolerated, and later it was reduced to doses of 18-30 cg. in three series of six injections separated from each other by 1-2 weeks. In cases belonging to the first group treatment resulted in retardation of gelification and finally in its disappearance. If the test failed to become negative under treatment, relapses might be expected. In the second group of animals treatment failed to affect the rapidity of gelification, and the animals usually died.

It is concluded that when gelification is delayed a favourable prognosis can be given but delay cannot be accepted as indicating freedom from infection and rapidity in gelification may indicate intense parasitism. If gelification occurs in the absence of disease symptoms the effect of treatment may help in the confirmation of the diagnosis. Animals which recover under treatment are not immune to experimental reinfection but after one or two attacks they appear to acquire sufficient immunity to protect them in an infected environment.

In his note the translator describes his treatment of a dog affected with leishmaniasis which was brought to Hamburg from Algeria.

As stibyal ' was not available W used neosalvarsan and neostrom-turan, but with no effect. Antimosan solution was then tried and was found to be well tolerated and reasonably effective with the advantage that it need not be given intravenously

CHUNG (Hui Lan) & FENG (Lan-Chou) Further Observations on Natural Infection of *Phlebotomus chinensis* in Peiping with *Leishmania*.—*Chinese Med J* 1941 June Vol 59 No 6 pp 540-542.

Of 57 female sandflies (*Phlebotomus chinensis*) captured in a kennel in which a dog suffering from kala azar was kept in a private house in Peiping 34 or about 60 per cent were found to be naturally infected with flagellates indistinguishable from *Leishmania donovani*. The flies had been collected between June 10th and July 6th 1940. In one of the infected flies there was a heavy infection extending from the proboscis to the midgut. A normal Chinese hamster inoculated subcutaneously with the flagellates from two of the flies contracted visceral leishmaniasis. C M II

YAO (Y T) & WU (C C) Notes on the Chinese Species of Genus *Phlebotomus*. Part IV. Diagnostic Tables for the Chinese Species of Sandflies with Some Remarks on their Geographical Distribution.—*Chinese Med J* 1941 July Vol 60 No 1 pp 73-78 With 5 plates

HO (E A) CHU (H J) & YUAN (I C) A Report of Two Cases of Canine Leishmaniasis with Reference to the Development of Skin Lesions.—*Chinese Med J* 1941 July Vol 60 No 1 pp 84-86 With 2 plates

Owing to the fact that in canine kala azar leishmania are frequently more numerous in the skin than in the internal organs, while various skin lesions commonly occur the view has been expressed by some that in kala azar it is the skin and not the organs that is primarily infected. In this connexion the history is given of two dogs that were found to be suffering from kala azar by the discovery of leishmania in the bone marrow. These dogs had normal skins in which parasites could not be discovered. During the course of the next six months the dogs showed signs of illness, while skin lesions began to appear. The globulin test previously negative became positive and parasites began to appear in the skin. Experience with other dogs has shown that whenever parasites are present in the skin they are demonstrable in the organs. It is concluded that the skin infection is secondary to infection of the organs. C M II

TORRES (C Magarinos) Sobre as alterações da pele do cão no kala azar sul-americano [Changes in Skin of the Dog in S American Kala Azar].—*Rev Brasileira Biol* Rio de Janeiro 1941 Apr Vol 1 No 1 pp 81-82.

The author has studied the skin of dogs suffering from infections due to human and canine strains of leishmania of kala azar in S America. The first change to occur is the accumulation of histiocytes along the blood vessels of the skin. These cells contain few parasites in the early stages of the infection. Later however,

the parasites are numerous. The histiocytes may accumulate into veritable nodules which show a tendency to fibroblastic change and retrogression. Associated with these changes there develops a vesicopustular dermatitis and occasionally actual ulceration of the skin—the result of a suppurative folliculitis and perifolliculitis. The lymphatics of the skin contain cells infected with leishmania and these cells in the intercellular spaces of the skin and in the superficial lymphatic plexus afford an opportunity of infection of the intermediate host.

In one dog a swelling of the feet, similar to the condition described in infected hamsters, was observed. This was caused by oedema and infiltration by histiocytes and other cells. C. M. H.

JIMÉNEZ DÍAZ (C.) & CASTRO MENDOZA (H.) Alteraciones de la lipodermia observadas en el Kala-azar [Alterations of Lipoid-dermia in Kala Azar.—*Rev. Clin. Española* 1941 Apr 1 Vol 2 No 4 pp 357-359 French summary]

In eleven cases of kala azar the authors have studied the lipoid and cholesterol content of the blood. In all but two of these in which the lipoid content was 810 and 620 mgm. per cent respectively the figure obtained was below the normal, which is between 480 and 700. In the case of the total cholesterol content in the above two cases alone was a figure above the normal of 150 to 180 mgm. per cent obtained. In the others it was considerably below normal. The ratio of free cholesterol to cholesterol esters, however is above normal indicating a diminished esterification of free cholesterol which is paralleled only by that which obtains in the severest hepatic insufficiency. It cannot be concluded that the paucity of esters is due to a suppression of the enzymatic esterification as a result of the action of substances elaborated by the leishmania. The flocculation phenomena characteristic of serum of kala azar cases is probably the result of the diminished amount of cholesterol esters. C. M. H.

ARANTES (Sebastião C.) A intradermo-reacção de Montenegro na lepra [Montenegro Intracutaneous Reaction in Leprosy]—*Folia Med.* 1941 Mar 23 Vol 22 No 6 pp 63-66 With 5 figs.

The reaction of Montenegro in leishmaniasis consists in the allergic response of the skin to intracutaneous inoculation of an antigen consisting of a phenolized saline suspension of culture forms of the parasite. The reaction has been found to be so specific that it is useful as an aid to diagnosis. Nevertheless, in certain cases of glandular tuberculosis a positive result was obtained. In the present paper an account is given of tests carried out with the leishmania antigen in 142 cases of leprosy of different types. In none of the cases was a positive reaction observed unless there was a history or other evidence of a previous leishmania infection. The leprosy infection did not modify the reaction in cases which had recovered from cutaneous leishmaniasis. In one case of leprosy in which a nasal lesion was present a positive reaction was obtained. Examination of scrapings from the nose led to the discovery of leishmania. Cases of leprosy which had recovered from their leishmania infection twenty years before still gave a positive Montenegro reaction. C. M. H.

NAPIER (L Everard) KIRWAN (E O G) & SEN (G) *Eye Complications of Dermal Leishmaniasis*—*Indian Med Ga* 1941 Sept Vol 76 No 9 pp 542-543 With 5 figs (1 coloured) on 2 plates.

An Indian 20 years of age who gave a history of recovery without treatment from some febrile disease which may have been kala azar presented himself for treatment for typical post kala-azar dermal leishmaniasis which began to develop five years before. Nodules and depigmented areas occurred all over the face and body and from these leishmania were recovered. The case differed from others of the kind in that the cornea in each eye was involved in the process giving rise to a leishmanial keratitis of a nodular type in one eye which obstructed vision almost entirely. Though in Bengal the cutaneous condition develops in about 5 per cent of persons who have suffered from kala azar this appears to be the first case on record in which involvement of the cornea has occurred. The fact that in this case there was no history of treatment for kala azar was not surprising for 25 per cent of the cases of this type of dermal leishmaniasis from Bengal give no history of such treatment. Vigorous treatment with potassium iodide and organic antimony compounds (neostibosan ureastibamine ammostiburea) was followed by resolution of the skin and ocular lesions so that a considerable degree of vision was restored. The paper is illustrated with photographs of the face and a coloured plate of the eye lesions which differ from the abscess type of involvement which may occur as a complication of oriental sore due to *Leishmania tropica* C M H

SOONG (H Y) & ANDERSON (Hamilton H) *The Evaluation of Drugs in Experimental Leishmaniasis*—*Amer J Trop Med* 1941 May Vol 21 No 3 pp 461-467 [14 refs.]

The authors describe a method for the evaluation of drugs to be used in the treatment of kala azar in which groups of experimentally infected hamsters are used. The treated and control groups should consist of 30 animals each. If reliable data are to be obtained, drugs of known composition alone should be tested. Thus ureastibamine the antimony content of which varies between 20 and 43 per cent is not a satisfactory drug to test. The dose employed for a single injection is one-tenth of the L_{50} dose (the dose which leads to the death of 50 per cent. of animals injected). The drug was administered in aqueous solution subcutaneously three times a week and was continued till a total quantity equal to the L_{100} or universal lethal dose had been given. For neostibosan this was 4 gm. per kilo. of body weight and for ureastibamine 3 gm. The animals were kept under observation for four months after which the survivors were examined. In the experiment with the two drugs mentioned all the treated animals were free from infection while all but one of the controls showed parasites in the spleen. From the data available it was not possible to form any opinion in favour of the one or the other drug. In addition to the direct action on the parasite of any drug a number of observations such as the acute and chronic toxicity tissue changes resulting from treatment, rate of elimination of the drug untoward reactions have to be taken into account. It is clear from the paper under

review that there is no rapid method for determining the value of any drug—which can only be arrived at by careful pharmacological technique C M H

ADAMS (A R D) *Studies in Chemotherapy XXVI. A Case of Indian Kala Azar treated with 4,4'-Diamidino Diphenoxy Pentane—Ann Trop Med & Parasit* 1941 Oct 21 Vol. 35 No 1 pp 53-54

The author describes the treatment of a case of kala azar in an Indian sea cook 35 year of age from Calcutta. The drug was given by daily intravenous injection of 2 mgm per kilo. of bodyweight. The treatment lasted eight days. On the fifth day the temperature began to fall and there followed a rapid general improvement—increase in body weight, shrinkage of the spleen, improvement in the blood picture. When the patient left hospital unexpectedly eighteen days after commencement of treatment he appeared to be well on the way to complete recovery. It was noted during treatment that after intravenous injection of the drug the patient became very quiet and languid while the pulse was rapid and thready. Observation on the blood pressure showed that within a minute of an injection this fell from 108/70 mm to a systolic pressure of 50 mm. There was a return to normal in 10 minutes. Following a dose of 100 mgm, given intramuscularly, a similar depression occurred followed by a slower return to normal. On no occasion was there loss of consciousness and the patient did not appear to be unduly distressed by the rapid fall in his blood pressure C M H

WINGFIELD (A L) *4,4'-Diamidino Stilbene in the Treatment of Kala-Azar—Ann Trop Med & Parasit* 1941 Oct 21 Vol. 35 No 1 pp 55-58 With 1 chart

The case reported is that of an Indian cook, 25 years of age. He had been treated with neostam, three injections of which (0.1, 0.1 and 0.15 gm) had been given in four days. Two days later intense irritation of the skin with oedema of the upper eyelids and upper part of the face was reported. There was no visible rash. Twelve days later the patient was admitted to hospital. Intradermal injection of 0.02 gm. of neostam was not followed by any reaction, nor was an intravenous injection of 0.1 gm given next day. As a supply of diamidino-stilbene was available treatment with this drug was commenced. Ten daily intravenous injections of 45 mgm were given. The early injections caused vomiting and all produced weakness and faintness and some breathlessness and headache. It was found that the unpleasant reaction could be avoided by injecting the drug slowly. After one of the early injections there was a marked fall in blood pressure. The temperature did not reach normal till three days after the completion of the course. A second course of 10 injections of 50 mgm. was followed by complete clinical cure. During the course of treatment blood sugar estimations showed that this fell parallel to the fall in blood pressure and it is suggested that the drug may exert an effect antagonistic to that of adrenalin C M H

ADLER (S) & TCHERNOMORETZ (I) Notes on the Action of 4,4-Diamidino Stibene on *Leishmania donovani* and *Leishmania infantum* in the Syrian Hamster *Cricetus auratus*—Ann Trop Med & Parasit 1941 Oct 21 Vol 35 No 1 pp 9-14

The paper describes experiments carried out by the authors on the treatment of Syrian hamsters experimentally infected with *Leishmania donovani* or *L. infantum*. The animals were infected by intraperitoneal injection of cultures or in the case of some of the experiments with *L. donovani* by direct inoculation of leishmania into the spleen—a method which leads to a rapid development of a heavy infection. The drug administered by injection daily or on alternate days in doses varying from 1 to 40 mgm per kilo of body weight was found to have a definite therapeutic action on both infections but those due to *L. infantum* were more resistant than those due to *L. donovani*. This corresponds with clinical experience which indicates that cases of Mediterranean kala azar due to *L. infantum* require at least three times as much ureastibamine or neostibosan to bring about a cure as do cases of Indian kala azar due to *L. donovani*. C M II

BRITISH MEDICAL JOURNAL. 1941 Nov 29 pp 774-775—Chemotherapy of Protozoal Infections

SHAH (M H) Report on the Epidemic of Oriental Sore in Delhi.—Indian Med Gaz 1941 Aug Vol 76 No 8 pp 449-457 With 23 figs on 2 plates. [11 refs]

Though isolated cases of oriental sore occur nearly every year in Delhi an outbreak such as the one described in this paper is unprecedented. It was first noted in the Ramajas High School which with another educational institution occupied a rocky ridge—the Kala Pahar—near Sarai Rohilla. Inspection of the 750 boys in these institutions showed that a large number were suffering from oriental sore. At the end of 1939 a survey of the entire population of the ridge revealed widespread infection. In addition to diagnosis by the discovery of leishmania in the sores a skin test was carried out on the boys of the school by the intracutaneous injection of leishman presumably an antigen prepared from cultures of the parasite. The result was read in 48 hours. Of 76 boys suffering from the disease 75 gave a positive reading while of 206 with no evident signs of oriental sore 140 were positive. The outbreak was so serious that dispensaries for treating those infected had to be established. Up to the end of 1940 4,215 cases had been treated while it was estimated that a total of nearly 20,000 cases must have occurred in Delhi during this period. A few dogs were encountered and two of these were found to have sores on the head. Leishmania were recovered from the sores on one dog. Sandflies—*Phlebotomus sergenti*—were prevalent in the district and examinations carried out by Dr R. O. A. SMITH showed that these were liable to infection with flagellates regarded as developmental forms of *Leishmania tropica*. As regards their general distribution on the body and their characters the sores corresponded with the many forms described by those who have studied the disease in other localities. There was considerable variation in severity. One labourer was found to have 239 active sores and scars of many healed ones. Various methods of treatment were employed. Scraping followed by dressing with tannic

(March 1942)

acid powder or magnesium sulphate paste has been found to be the treatment of choice. Tartar emetic ointment (4 per cent.) has given good results, considered to be due to its necrogenic effect. Injection of trivalent or pentavalent antimony compounds has been found to be the only specific for the disease. Experience of this epidemic appears to indicate that no single line of treatment can be expected to cure all cases. Each case must be treated individually according to the progress made. The paper which is illustrated with two pages of photographs, is a valuable one which will repay careful study. C 31 11

SEVERI (H. A.) On the Polysaccharide of *Leishmania tropica* — Amer J Hyg 1941 Sept Vol 34 No 2 Sect C pp 63-68

The author has applied to the culture form of *Leishmania tropica* methods which have been employed for chemical fractionation of bacterial antigens. He has shown that the leptomonads have a flagellar antigen which gives large-flaking loose-knit clumps and a somatic antigen giving small-flaking tight-knit clumps. The fractionation reveals an S fraction which is polysaccharide and thermostable and an H fraction. When these fractions are tested by intracutaneous injections it is found that non-immune individuals are not allergic to S or H fractions or to whole leptomonads. On the other hand, patients suffering from oriental sore are allergic to both fractions and to both killed and living leptomonads. The skin reaction appears in 15 to 30 minutes, reaches a maximum in 24 hours and fades gradually away in four to five days. In individuals who have recovered from oriental sore the allergic reaction with the S fraction is not constant. On the other hand the whole leptomonad give rise to a definite reaction. C 31 11

ADLER (N.) & BER (M.) Transmission of *Leishmania tropica* by the Bite of *Phlebotomus papatasi* — Correspondence — Nature 1941 Aug 23 Vol 148 No 3747 p 227

This is a preliminary note to the effect that female *P. papatasi* fed through a membrane on a suspension of flagellated in three parts 2/7 per cent saline and one part inactivated defibrinated rabbit blood produced 28 lesions of cutaneous leishmaniasis in five of eight human volunteers. The sandflies were kept at a temperature of 30°C. C 11

REY MATIZ (Hernando) Observaciones sobre leishmaniasis (Studies on Leishmaniasis). — Rev. Facultad de Med. Bogota 1941 July Vol 10 No 1 pp 5-54 With 3 figs

The following is a translation of the author's conclusions —
Cutaneous leishmaniasis is widespread in Colombia.
1. Material from ulcers of human leishmaniasis was injected into dogs with positive results.
2. Similar attempts were negative when *Dasyprocta variegata* (the agouti) was used as the test animal.
3. Studies on cultivation immunological reactions, vectors and mode of transmission are necessary for the specific classification of leishmaniasis in Colombia. C 11

DO AMARAL (A D Franco) Observações sobre a resistência das culturas de *Leishmania brasiliensis* a várias temperaturas [Resistance of *L. brasiliensis* Cultures to Various Temperatures.]—*Arquivos do Inst Biol* Buenos Aires 1940 Vol. 11 pp 5-9 English summary

The author has tested the action of cold on cultures of *Leishmania brasiliensis*. Continuous or interrupted exposure to a temperature of 5°C to 10°C for 50 days caused cultures which had been grown for four days at the usual culture temperatures to lose vitality. Nevertheless subcultures from the exposed cultures grew well. Similarly if cultures which are being maintained at 23°C are exposed daily to a temperature of -9°C for a sufficient time to freeze the culture—daily freezing and thawing—there is after a week of such treatment evidence of loss of vitality which however is restored by keeping the cultures continuously at 23°C for 12 days. The same effect is noted if the cultures are kept continuously at -9°C for 15 days. Continuous freezing for more than 15 days kills the cultures. Cultures kept at -9°C. to 9°C did not flourish. at 12°C to 13.5°C there was scanty growth. at 14°C to 16°C. growth was abundant while it was exuberant at 20°C to 28°C. Growth fell off at 30°C and was nil at 33°C.

C M II

PESSÔA (Samuel B) & COUTINHO (J O) Pesquisa de *Leptomonas* em dípteros hematofagos de uma localidade com alta incidência de leishmaniose tegumentar [Search for *Leptomonads* in Blood-Sucking Diptera in a Locality where the Incidence of Cutaneous Leishmaniasis is High.]—*Folia Med* 1941 Sept 5 Vol. 22 No 17 pp 199-200

In an earlier publication the authors reported the results of their examination of species of *Phlebotomus* for naturally occurring leptomonas infections in a part of Brazil where the incidence of cutaneous leishmaniasis is high. In the present paper they give the results of the examination for similar infections of a number of other biting insects. In no case was a leptomonas infection encountered. In species of *Phlebotomus* (*P. migonei*, *P. whitmani*, *P. pessoai*) of which 6920 were dissected an incidence of natural leptomonas infection of 0.23 per cent was obtained.

C M IV

PESSÔA (Samuel B) Profilaxia da leishmaniose tegumentar no Estado de São Paulo [Prophylaxis of Cutaneous Leishmaniasis in São Paulo]—*Folia Med* 1941 July 25 Vol 22 No 14 pp 157-161 With 1 map

Writing of cutaneous leishmaniasis in the State of São Paulo Brazil the author discusses possible methods of prevention. He dismisses action against sandflies (species of *Phlebotomus*) owing to lack of precise knowledge of the actual vectors or their habits. The suggestion that leptomonads of latex producing plants may have some connexion with the leishmaniasis is without foundation. Dogs which have sometimes been shown to suffer from cutaneous leishmaniasis might act as reservoirs of the virus but in the district investigated it was not possible to obtain evidence that dogs were infected. It seemed evident that human beings alone are carriers of the leishmania.

in this locality. It has been noted that recovered persons are immune to any further attack, so that artificial production of immunity might be regarded as a prophylactic measure if this could be carried out. According to a vaccine consisting of the culture forms of eleven strains of *Leishmania brasiliensis* grown on \ \ \ medium was prepared and injected on three occasions at weekly intervals into 527 persons who were previously shown to be non-immune by the Montenegro skin test. Of these persons 17 subsequently developed cutaneous leishmaniasis but five of these did so in less than a month after vaccination, a period which is too short for the development of satisfactory immunity. Of 444 vaccinated individuals who were followed up 12 or 27 per cent developed the disease after one month from the time of vaccination. Of 683 unvaccinated non-immune individuals 108 or 15.6 per cent contracted the disease in the same time. It would thus appear that vaccination confers an appreciable degree of protection.

Treatment if successfully carried out reduces the risk of infection to others but there is no single infallible remedy. In the first place tartar emetic for adults and fousadin for children are advocated. If these fail, alternating treatment with tartar emetic and eparceno or arsenite of soda may be tried while finally for cases resisting these drugs anthraomahn, iodo-bismuthate, quinine diathermy, application of lactic acid or injections of atabrin in the tissues around the lesions may be tried.

C M II

MALARIA

MINISTRY OF SHIPPING Malaria among Merchant Seamen. Notice No M 178 11 pp London 1940 Jan

This pamphlet has been prepared for the use of masters of ships and of non-medical members of the crews. In it are described methods of preventing mosquito bites especially in relation to the mosquito proofing of ships, quinine prophylaxis the symptoms of attacks and the methods to be employed in treatment. It is clearly written and should be in the hands of all ships' masters—it might also be read with advantage by employers ashore.

C II

MINISTRY OF SHIPPING Malaria among Merchant Seamen. Memorandum for the Use of Ship's Surgeons. Notice No M 185 18 pp. With 6 charts London 1941 Feb

This pamphlet is written for the use of ship's surgeons and contains a succinct but useful account of the clinical features of the disease and of methods of treatment. No attempt is made to give instruction on the staining or recognition of parasites or on the entomology of malaria. In treatment, no mention is made of the administration of alkalis where quinine is given. There are brief notes on prevention of mosquito bites and on drug prophylaxis. The subject is important in view of the considerable number of cases of malaria reported in ships' crews since the beginning of the war.

C II

ROBERTSON (R Cecil) & CHANG (T L.) Malaria Survey in Western Yunnan, Lungling Area and Lushih County.—*Chinese Med J* 1940 Oct. Vol. 58. No 4 pp 446-455 With 1 map

See ROBERTSON this *Bulletin* 1941 Vol. 38 p 501

CLARK (R H P) & CHOUDHURY (M A) Observations on *Anopheles leucosphyrus* in the Digboi Area, Upper Assam.—*Jl Malaria Inst of India* 1941 June Vol 4 No 1 pp 103-107 With 3 figs on 2 plates

A. leucosphyrus is a serious vector of malaria among human beings living close to jungle

The observations were made in and about the oil wells at Digboi Assam an area in which *A. minimus* previously the most important carrier is well under control. There is now very little malaria in the employees but such people as woodcutters who live on the edge of jungle still suffer intensely. In these areas *A. leucosphyrus* breeds in small collections of stagnant water. It is fairly often found in houses, and the sporozoite rate was 2.4 in 859 dissected.

[The paper may have much more than local importance. Though *A. leucosphyrus* was previously known as a carrier both in Assam and in the Dutch East Indies it is often dismissed as a jungle species not often seen unless searched for. Evidently it may have considerable importance in forested areas and as it has a wide distribution in India and eastwards through Burma and the Malay Peninsula to the Philippines and Celebes the matter is of military interest.]

P A Buxton

GENEVRAI (J) & TRY (H. T.) Etude malarologique de la région Tong Sontay. [Malaria Survey of the Tong Sontay Region.]—*Rev Méd Française d'Extrême-Orient* 1940 Nov-Dec. No 9-10 pp 566-573 With 1 folding map

This is a report of a malaria survey carried out in the Tong area which lies to the south of the Red River just to the east of the low foot hills of Mount Bavi. There is an aerodrome there and in 1939 it was proposed to create an important industrial centre in the neighbourhood hence the survey. Malaria appears to be only moderately endemic in most of the area surveyed. The anopheline fauna is rich but the most important vectors of Indo-China, though present have a very limited distribution. The following species of *Anopheles* were found: *sinensis vagus philippinensis* (the three most prevalent species) *barbirostris lesselatus kochi fuliginosus karwari aconitus minimus* and *jeyporiensis*. Of the dangerous species *A. aconitus* was most widespread. *A. minimus* was found in only two villages in the south of the area surveyed.

Norman White

PATTANAYAK (G C) Malignant Malaria simulating Other Diseases.—*Jl Indian Med Assoc* 1940 Dec. Vol 10 No 3 pp 123-124

Brief clinical notes are given of four cases of malaria in which the symptoms simulated those of other pathological conditions. One patient was admitted into a cholera ward of a hospital as a case of cholera during an epidemic of that disease. Another was diagnosed

as acute bacillary dysentery. The other two had symptoms of intestinal obstruction one of them narrowly escaped operation. All four patients responded to anti malaria treatment and recovered. N W

VAYONIS (George) Blood Studies in Malaria. The Genesis of Blood Cells in Relation to Treatment with Quinine.—*Amer J Med Sci* 1940 Dec Vol 200 No 6. pp 809-819 With 8 charts. [20 refs]

This paper presents the data obtained from counts of the reticulocytes, erythrocytes and leucocytes made during the treatment of four patients suffering from subtertian malaria. The patients were children all members of the same family who were in hospital together one of them was in a state of coma on admission. They were undernourished and anaemic. Daily blood examinations were made and the results are recorded on instructive graphs. A reticulocytosis followed the regression of fever and the disappearance of asexual parasites from the blood when numerous gametocytes appeared. On the third day after treatment began the reticulocyte curve was 4 000 to 100 000 per cmm. The peak of the reticulocyte curve was reached about the 11th day after the start of treatment, and their numbers remained between 400 000 and 800 000 for the next seven to nine days. Thereafter their number began to fall abruptly. The erythrocytes, microcytic at the time of admission decreased in number until about the 11th day of treatment. The total red cell count remained low at about 2,500 000 all the time the reticulocytes were abundant. After the reticulocyte count began to decrease about the 18th day the red cell counts progressively increased and normal sized erythrocytes began to appear. The leucocytes ranged from 7 000 to 16 000 per cmm till about the 11th day when the reticulocyte count was highest and the red cell count lowest. Then the leucocytes began to decrease largely at the expense of the neutrophils, and continued to decrease throughout the period of reticulocytosis. When the reticulocytes began to decrease a progressive increase of leucocytes began, accompanied by a marked eosinophilia. The lymphocytes, basophiles and large mononuclear cells were unaffected. The temporary granule penia was probably a genetic phenomenon. This is indicated by its relationship to changes in the reticulocytes and to the total red cell and by the development of eosinophilia at its termination. N W

BISHAM (W N) Toxic Reactions following the Use of Atabrine in Malaria.—*Amer J Trop Med* 1941 May Vol. 21 No 3 pp 455-460 [14 refs]

When atabrine was first used there were many alarming reports as to its toxicity in many quarters physicians are said to be still doubtful of its safety. The author has made a study of all reported reactions in 49 861 cases in which atabrine was administered of which 7,915 were under his personal supervision. The nature of the commonly reported toxic symptoms is discussed. The slowness of the elimination of the drug is an important factor in producing toxic reactions. The author thinks that the bowels should be freely opened and kept open by saline cathartics if necessary and that liquids should be freely taken during the administration of the drug. The conclusion is reached

that the toxicity of atebirin is of small importance and though it should always be considered it should not deter physicians from the use of the drug

N IV

DALÉAS (P) *Traitement du paludisme grave par le quino bleu*
[Treatment of Severe Malaria with "Quino bleu."]—*Rev Méd Française d'Extrême-Orient* 1940 Feb No 2 pp 96-101

Quino bleu contains chlorohydrate of quinine 15 cgm arrhenal 2 cgm methylene blue 2 cgm. normal saline 5 cc. It is put up in ampoules and is given intravenously two or three times a day. The author claims to have a long and wide experience of the treatment of malaria in Indo-China as the result of which he has reached the conclusion that quino bleu is at present without rival as a safe and effective remedy in the treatment of grave cases of malaria. Necessitating as it does repeated intravenous injections the treatment is only suitable for hospital cases. It also has the disadvantage of producing a bluish discoloration of the skin. For these reasons the treatment should be reserved for grave cases in such cases remarkable improvement in the patients condition follows the first injection.

N IV

LIU (Shao-kwang) CHANG (Yao-teh) CHUAN (Tz e-kwang) & TAN (Shih-chieh) *The New Antimalarial Drug Sinoine A Preliminary Report.*—*Chinese Med J* 1941 June Vol. 59 No 6. pp 575-577

Sinoine is an alkaloid obtained from the root bark of *Fraxinus malacophylla* it differs from quinine in many physical and chemical properties but possesses antipyretic action in induced fever in rabbits and immobilizes infusoria. Powdered root bark was tried in the treatment of malaria in 34 cases the dose being 3 gm. of dried powder thrice daily after meals for adults correspondingly lessened for children. Within 8 days parasites (of all three species) had disappeared from the blood, and splenic enlargement was reduced. Stem bark and leaves are also effective. In some children vomiting or tinnitus was produced if large doses were given. There were no recurrences of malaria.

It is concluded that this drug is as satisfactory as quinine and that in view of the fact that the tree is common in Yunnan its economic value is greater

C IV

FIELD (J W) NIVEN (J C) & MITCHELL (J F) *Field Observations on the Use of M3 for the Prevention of Malaria.*—*Bull Inst Med Res Federated Malay States* 1940 No 5 8 pp With 4 figs

The Italian Biochemical Institute of Milan has issued a drug which is known as M3 and is claimed to be very successful in the treatment and prevention of malaria. It contains mercury to increase phagocytosis manganese to foster haemopoiesis and extract of spleen to stimulate the reticulo-endothelial system and develop immunity. A course of treatment of 72 tablets over a month it is claimed will build an effective immunity which will last for about a year in temperate zones and for six months in the tropics. Previous records of the use of M3 have been noticed in this *Bulletin* [1938, Vol. 35 p 31 1940 Vol. 37 pp 503 746 see also 1939 Vol. 36 p 262]

For testing a supply which was sent by the manufacturers agents 300 Tamils recently arrived on a malarious plantation were selected

and divided into three groups of a hundred. Group I had the full course of M3. Group II a weekly dose of one gramme of quinine sulphate. Group III unprotected for control.

Protocols are presented and the figures analysed. There is no need to detail these. The numbers were small, and the amount of quinine hardly sufficient for protection. Two months after the prophylactic attempts were started the plantation was swept by an outbreak of subtertian malaria—a good test of the new drug. The upshot of the experiment was that the drug did not produce any significant difference in the parasite rate. Incidence was high in all groups and only in the second group was there any evidence of reduction. M3 did not modify either the incidence or the severity. Lastly there were no signs of any effective immunity even after the complete course suggested by the makers. [The list of references contains several errors. CABRAL's article was published in July 1937 not 1939. CHOPRA and BROWN should be CHOPRA and BASU and the publication in which their paper appeared is the *Jl Malaria Institute of India* not *Survey*. FATTORICH and LESTI's article was published in *Arch Ital Sci. Med. Colon e Parassit* 1938 not 1939.]

H H S

MENU (P) & TOUMANOFF (C). Le choix d'emplacement des campements et les indisponibilités pour le paludisme dans les effectifs militaires en campagne. [Selection of Camping Sites and Malaria Invalidity among Troops on Service.]-*Rev Méd Française d'Extrême-Orient*. 1940. Oct. No 8 pp. 519-528. With 4 plans & 1 graph.

This paper emphasizes the importance of the careful selection of camping sites for troops in country in which there is hyperendemic malaria, and illustrates some of the factors to be considered in such selection by the experience of four small detachments of troops which were engaged on road construction where the frontiers of Annam, Cochun China and Cambodia meet. Here *A. sinensis* is the most dangerous vector and the danger of clearing bush or other shade from the vicinity of water is stressed. The experience of the four detachments shows that it is possible to safeguard the health of troops in a hyperendemic area if the site of camps can be determined on the basis of clinical and entomological surveys.

N IV

✓ (D. L.)
Tea Garden
" Spray
No. 1 pp.

in mal
District
local

Malaria Control in a Hyper-
by the Use of Pyrethrum No 20 as
Inst of India. June.
1 map & 8 graphs

carried out
in which
a diminution
of *A. sinensis*
out of
20
599

of

closure was not attempted. During the nine months in which spraying was carried out the incidence of clinical malaria in the garden as a whole was appreciably lower than the expected incidence, even allowing for a continuation of the downward trend of morbidity referred to above, but there was no significant difference in the malaria morbidity of the inhabitants of sprayed and unsprayed houses respectively as indicated by hospital attendances. The infant malaria index however fell 40 per cent during this period in the sprayed houses while it rose 95 per cent. in the unsprayed houses. The spleen rates of children aged 2 to 10 in the two groups were almost identical, about 80 per cent. There was a definite decline in the parasite rates of both children and adults in the sprayed group of houses in the unsprayed houses there was no such decline. Anopheline infestation of sprayed houses was only very slightly lower than that of the unsprayed houses, but of 421 *A. minimus* captured in sprayed houses only two were infected whereas 13 infected *A. minimus* were found among 705 captured in unsprayed houses.

N IV

KNIFE (Fred W.) The Use of Solidified Carbon Dioxide in Developing Pressure for Spray-Killing Adult Mosquitoes in Malaria Control.—*Amer J Trop Med* 1941 Sept. Vol 21 No 5 pp 671-679 With 2 sketches & 2 figs

This paper describes the construction and adjustment of equipment in which solidified carbon dioxide is used to generate gas pressure to operate a spray-gun for killing adult mosquitoes. Most good paint spray-guns give good atomization when properly adjusted but most methods of producing the necessary gas pressure at present in common use have their disadvantages. If solidified carbon dioxide can be obtained at reasonable cost (which was not the case in South India) it is considered by the author to be the ideal source of pressure. It gives adequate pressure without auxiliary equipment it is easy to operate and carbon dioxide mixed with atomized kerosene vapour the usual diluent of the insecticide diminishes the risk of fire.

The apparatus designed by the author is simple to construct. Details of its construction are clearly described and illustrated. A safety blow-off valve is of course essential.

A cake of solidified carbon dioxide six inches cube lasted about four hours during which time an average of 45 Indian houses were sprayed.

N IV

KENNEDY (J S) Lethal Concentration and Mode of Action of Copper Sulphate used as a Mosquito Larvicide.—*Jl Econom Entom* 1941 Vol 34 No 1 pp 86-89 [Summarized in *Rev Applied Entom* Ser B 1941 Nov Vol 29 Pt 11 pp 174-175]

Tests of copper sulphate as a mosquito larvicide were carried out on the northern German and Portuguese strains of *Anopheles maculipennis* Mg var *atroparvus* van Thiel using the technique described by Bates. The media were distilled water and Medium S. Most larvae survived for three days in the presence of 1 part anhydrous copper sulphate in 50 000 but very few could reach the second instar unless the dilution was as much as 1 part in 500 000. The average survival rates were much higher in Medium S than in distilled water but the results with the latter were very erratic. It was shown that copper sulphate at 1 50 000 can poison the larvae directly apart from

its effect on the microfauna. At lower concentrations, destruction of the food supply may influence survival. Copper carbonate was precipitated when copper sulphate at 1:10,000 was added to tap water and to water from a ditch in Albania in which *A. maculipennis typicus* abounds in summer. In experiments in which larvae of *A. a. atroparvus* of the Hamburg strain were kept in dishes of the ditch water with the addition of copper sulphate at 1:10,000, 1:50,000 and 1:100,000 all died, whereas in the water without copper sulphate 82 per cent. survived, and in Medium S with the addition of copper sulphate at 1:100,000 about 80 per cent. survived. The increased kill is probably due to the ingestion of copper in larger quantities when it is present in the solid form.

FIELD (J. W.), NIXON (J. C.) & MITCHELL (J. F.) Field Observations on the Effect of Prophylactic Plasmoquine on the Incidence, Course and Severity of *Falciparum* Malaria.—*Bull. Inst. Med. Res. Federated Malay States*. 1940. No. 4. 8 pp. With 4 figs.

The observations here recorded were carried out on an isolated plantation in Selangor. There was intense malaria with uncontrolled breeding of *A. umbrosus* and *A. notumbrosus*. Most of the malaria was due to *P. vivax* but *P. falciparum* infections were fairly common. For a period of one year 0.02 gm. of plasmoquine was given twice a week to each of 96 per cent. of the population which averaged 645. A group of infants born on the plantation received no plasmoquine; they provided clinical data of transmission. Attacks of malaria were treated with quinine for one week. There was considerable residual *falciparum* malaria when the plasmoquine medication started and a certain amount brought in by newcomers or contracted somewhere and somehow during the course of the observations. The transmission of *P. falciparum* appears to have been very low during plasmoquine administration: gametocytes were found only six times in 2,000 routine blood examinations, and only one *falciparum* infection was detected in the blood of 20 infants born during the course of the experiment and examined every week. Altogether there were 231 attacks of *falciparum* malaria among people undergoing plasmoquine prophylaxis: most were probably recurrences of old infection, but not all. Moreover prophylactic plasmoquine does not appear to have modified the severity of attacks of *falciparum* malaria as measured by intensity of parasite infestation of the blood. It is concluded that in areas where fresh transmission of *falciparum* is slight and infections are mostly residual or contracted elsewhere the prophylactic administration of plasmoquine at a dosage of 0.02 gramme twice a week may not markedly affect either the general course or the incidence and severity of clinical attacks.

A. W.

HELMINTHIASIS.

SAUNDERS (G. M.) A Comparison of the Incidences of Filariasis (*Wuchereria bancrofti*) in the Islands of St. Thomas and St. Croix.—*Amer. J. Trop. Med.* 1941. May. Vol. 21. No. 3. pp. 481-483.

Though these two islands lie only about 40 miles from one another though there is frequent intercommunication and though *Culex fatigans* is common in both filariasis is very common on St. Croix, very rare on St. Thomas. What is the reason?

The data for St Croix are 200 consecutive admissions to the Municipal Hospital Christiansted examined by KNOTT in 1939. In St Thomas are 195 persons chosen at random and examined by Saunders the former used 20 cmm. of night blood the latter 1 cc. of day blood Knott having shown [this *Bulletin* 1940 Vol. 37 p 304] that the two methods give comparable results. Saunders's examinations disclosed microfilariæ in the blood of one person only a negress aged 42 (who had visited Porto Rico and St. Croix) she had no clinical signs but he found suspicious physical signs in two others elephantiasis of the left leg in one and a brawny swelling of the same part in the other. Microfilariæ were present in 25 per cent of those recorded in St. Croix and physical signs in about 12 per cent. As a possible reason for this difference it is pointed out that the population of St. Croix is essentially rural and agricultural in St. Thomas urban and non-agricultural.

"It is certain that there are one or more factors in St. Thomas which tend to interfere with the natural life cycle of the filaria. A complete understanding of these factors might lead to simple methods of control in St. Croix."

Clayton Lane

YOSINO (Takayosi) & NAKASATO (Tyotei) On the Distribution and the Degree of Infection of *Wuchereria Bancrofti* in Yaeyama Islands, Okinawa Prefecture.—*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1941 Apr Vol. 40 No 4 [In Japanese pp 749-760 [19 refs.] English summary p 761.]

The authors have examined the night blood of 5 086 persons in the Yaeyama islands to the east of Formosa. The percentages positive range from 6.17 in Imomote to 29.29 in Hateruma. In the age group 1-5 years the percentage is 3.45 and this rises to 23.54 at age 21-30 and 24.26 at ages above 60. The youngest person found infected was aged 18 months and from this it is deduced that the time necessary for development of the worm and production of microfilariæ is about one year. The degree of infection measured by the examination of 0.1 cc of night blood was —60.24 per cent. light 35.35 medium and 4.41 heavy except in Hateruma where medium infections are the most common.

C IV

OHAMA (Simken) Investigation on the Incidence of *Wuchereria Bancrofti* among the Primary School Children of Sirara in Yaeyama District, Okinawa Prefecture.—*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1941 June Vol 40 No 6 [In Japanese pp 1164-1168 English summary p 1168.]

Night blood was examined from 416 children and *Mf bancrofti* was found in 24.04 per cent. There were very few heavy infections but the degree of infestation was found to increase with age. C IV

OHAMA (Simken) On the Examination of *Microfilaria Bancrofti* in Day Blood.—*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1941 May Vol. 40 No 5 [In Japanese pp 941-944 English summary p 945.]

The author made an examination of 32 carriers (3 [?] 4] heavy 6 moderate 19 light 3 lightest) of microfilaria Bancrofti among children

and employees in the Taketomi elementary school on day blood after the method performed by James Knott at 9 to 10 o'clock in the morning. When the amount of day blood was the same as that of night blood (20 cmm) only 1 (3.13 per cent) was positive while with 50 times (1 cc.) as much as the amount of night blood among 32 carriers 22 (68.75 per cent) were positive of which the heavy and moderate were both 100 per cent., the light 57-88 per cent. and the lightest 33.33 per cent. and with 250 times (5 cc.) 10 (100 per cent.) were positive among 10 carriers examined."

BONNE (C.) LIE KIAN JOE, MOLENKAMP (W. J. J.) & MEYER (F. W.) *Wuchereria malayi* de macrofilaria behoorende bij de microfilaria malayi. (W. malayi the Adult of *W. malayi*).—*Geneesk. Tijdschr. v. Nederl. Indië* 1941 July 15 Vol. 81 No. 28 pp. 1487-1501 With 6 figs. on 2 plates. English summary [13 refs.]

Description of male and female of *Wuchereria malayi* found in a Malay patient (G) who suffered from spleno-medullary leucemia and who died from urosepsis after an operation for calculus vesicae.

On dissection under the binocular microscope of a number of scarcely enlarged inguinal glands with their surrounding tissues to which one enlarged popliteal gland was added one complete male one complete immature female and a number of parts of mature females were discovered.

"The patient did not show symptoms of filariasis. His blood contained numerous microfilariae malayi. Bancrofti microfilariae were absent. The larvae in the uterus in the fragments of mature females were typical malayi larvae. The larvae from the uterus of a bancrofti female which was available for comparison, showed typical bancrofti structures. This seems to exclude the possibility of microfilaria malayi and bancrofti being different stages of larval evolution of the same filarial species. The male was present in the same cluster of inguinal glands which contained fragments of mature females.

The structures of the adult worms correspond in general with the description of *Wuchereria malayi* given for the first time by SUNDAR RAO and MAPLESTONE.

"Length of the male 2.6 cm. diameter 90 μ . Length of the complete immature female 4 cm. diameter 120 μ . Diameter of fragments of mature females 170 μ .

"The bulbous head shows two rows of very minute papillae. The apex of the tail is rounded. The tail of the male shows about 2 $\frac{1}{2}$ spiral turns.

The vulva is situated 900 μ from the anterior end in the mature worms. The distance between anal orifice and apex of the tail in a mature female was 280 μ . Distance between the male cloacal orifice and the apex of the tail 150 μ .

"Cuticula of the tail of the male with fine transverse striations becoming narrower near the tip (3 μ -2 μ apart). No cuticular striations in other parts of male or female.

Long spicule of the male surrounded basally by a sheath with oblique opening and spiral strengthening of its wall. An extremely delicate filmy membrane follows the free part of the spicule for over half its length. This may be an artefact, however. Tip of the spicule not much flattened or widened. Length of the long spicule 360 μ of which 190 μ comes for the free part.

Short spicule stout not clearly visible probably built up by two parts a sturdy basal part and a less chitinized terminal part situated in or alongside the wall of the above mentioned sheath both parts about 60 μ long. A short, boat or crescent shaped gubernaculum with unequal arms, strongly chitinized and easily visible.

Base of the spicular apparatus with distinct transverse corrugations.

Four thick papillae not easily to be made out on the left side of the cloaca in a fold. On the right side No. 4 of these papillae is under developed and practically absent. Probably two tiny postanal submedian papillae on each side one very near the tip of the tail and one about halfway.

There seems to be no doubt that the worms in question were the adults of *microfilaria malayi*. They closely resemble *Wuchereria bancrofti*. The transverse corrugations of the spicular apparatus a feature present in *W. bancrofti* but not visible in the males of *malayi* described by SUNDAR RAO and MAPLESTONE are present in our male specimen. The main difference between the adults of *malayi* and *bancrofti* seems to be the number and shape of the cloacal papillae and folds as indicated already by SUNDAR RAO and MAPLESTONE. In view of the still existing uncertainties about these structures we feel that we are not in a position to give conclusive evidence on this point before more material is collected and available for study.

HU (S M K.) Studies on the Susceptibility of Shanghai Mosquitoes to Experimental Infection with *Microfilaria malayi* Brug. IV *Culex vorax* Edwards.—*Peking Nat Hist Bull* 1941 Vol 15 Pt 3 pp 215-216 [Summarized in *Rev Applied Entom Ser B* 1941 Sept. Vol 29 Pt. 9 p 140]

An account is given of an experiment similar to others already noticed that was carried out in 1939 in Shanghai to test the susceptibility to infection with *Filaria (Microfilaria) malayi* of females of *Culex vorax* Edw. reared from larvae collected locally. Of 18 adults that engorged on a case with a heavy infection 3 out of 11 dissected 19 days later and 1 out of 7 dissected 23 days later each contained one infective filarial larva. The other 14 mosquitos were negative. None of the infective larvae showed any sign of chitinisation but the fact that only one larva was found in each infected mosquito indicates that it is improbable that this species plays a significant part in the transmission of the parasite under natural conditions in the Shanghai region where moreover the adults are seldom seen in inhabited houses.

KOBAYASHI (Hidekazu) On the Development of *Microfilaria bancrofti* in the Body of the Mosquito (*Culex fatigans*).—*Taiwan Igakkai Zasshi (Jl Med Assoc. Formosa)* 1941 May Vol. 40 No 5. [In Japanese pp 891-910. With 1 chart. [27 refs.] English summary pp 911-912. With 14 figs. on 2 plates.]

RAO (S Sundar) & SUKHATME (P V) Seasonal Variations in the Incidence of Filarial Lymphangitis.—*Indian Jl Med Res* 1941 Jan., Vol 29 No 1 pp 209-223 With 11 graphs.

Statistical analysis of the variation in monthly admissions of patients, new and old at the Filariasis Clinic of the Calcutta School of Tropical Medicine during the period from 1929-1938 is carried out

with the object of defining precisely the nature of the periodical movement recurring year after year in the incidence of filarial lymphangitis. The analysis showed that the monthly incidence during the monsoon period from July to September when the humidity is high and the temperature optimum is 40 per cent. higher than in the winter period from October to February. The period from March to June showed an incidence slightly higher than the average giving an appearance of a prelude to the monsoon period of the highest incidence.

JOURNAL OF THE INDIAN MEDICAL ASSOCIATION 1941 Mar Vol. 10 No. 8 pp. 331-336 With 9 fig. on 2 plates. [14 refs.]—A Symposium on Surgical Complications of Filaria (RAY (P. N.) Opener RAMANAMURTI (M. V.) Discussion pp. 336-341 MENON (T. Bhaskara) RAMANAMURTI (B.) MAHADEVAN (R.) RAO (W. V. S. Kameswara)

The delivery of these papers covered two days of the Proceedings of the Scientific Section of the VII All India Medical Congress, 1940 held at Vizagapatnam under the Presidency of B. Tirumal Rao.

P. N. RAY in opening the session, held filarial infestation to be due to a specific infection or lesion of the lymphatic endothelium due to the presence or passage of parasites adult or young, and to their toxins which cause definite cellular reaction in lymphatic vessels and surrounding tissues, particularly in the lymphatic glands. The enlargement of these last is due to formation of eosinophil granulation, particularly near the vulval end of the worm, and it is such inflammatory reaction and not mechanical obstruction by adult parasites that causes lymphatic obstruction, compensatory lymphatic circulation being quickly established. The effects of drupal partition of the adult female parasite imprisoned in an obstructed lymph vessel, may be conjectured but are not so easily demonstrated. What effect the myriads of microfilariae alive or disintegrated, will have on the endothelium deserves further careful investigation. No doubt is felt that the inflammatory attacks are not due to streptococcal infection but to the adult parasites though in a large number of cases there is superadded pyrogenic infection. Sulphamylamide has been effective even when no secondary streptococcal infection is present, the action not appearing to be specific and parasitocidal. For recurrent attacks induced by tertian malaria is advised, though it is not yet known how high and how long the fever should be to destroy the parasites. Antigens from hydrocele have been used therapeutically. There is no specific drug. For lymph scrotum no operation should be undertaken while there is leakage. Chyluria is a feature in areas of low endemicity and in about two-thirds of the cases the leakage of chyle is from the mucosa of the bladder. For management the foot of the bed should be raised and fat should be avoided in the diet (but see MAHADEVAN below). Lymph varix of the spermatic cord may be treated by injection into it of 10 per cent. sodium morrhuate solution. For elephantiasis of the limbs there is advised either a modified Anchienclos operation, or a gluteo-plastic one, large flaps from the two areas being transposed (see KNOTT this Bulletin 1939 Vol. 36, p. 152).

M. V. RAMANAMURTI, in his address as seconder, stated that though inflammatory attacks may possibly be due to filarial toxins, staphylococci and in a few instances streptococci were isolated from abscesses.

The treatment advised was sulphanilamide and vaccine. He deprecated the induction of fever by malaria and considered injection of T.A.B. vaccine to be preferable. Since using sulphanilamide and filarial vaccine before operation he had had no septic complications after scrotal amputation. Skin grafting of the penis is unsatisfactory for there is no loose tissue under the graft and it does not stretch but if the preputial skin remains unaffected the loose tissue under it does allow normal function yet healing always leaves a circular ulcer at the base. He noted that with a lymphuria there might be in the urine as much blood as lymph and he had seen steady lymphorrhagia from the urethra three years after an operation for scrotal elephantiasis.

T. BHASKARA MENON in opening the discussion noted that round living parasites there may be no reaction but that when reaction occurred it might be either an acute eosinophil inflammation with oedema (regarded as allergic and explaining filarial fever, elephantoid fever and lymphangitis) or a filarial granuloma with formation of a pseudotubercle due to absorption of a dead worm or present round a calcified one. The passage in the human body of the infective larva from the mosquito is held to be by the lymph only since it is difficult to explain how something 1800 μ long and 25 μ to 30 μ broad can pass the capillary plexus of the lung*. His experiments in lizard and man tend to show that it is the lymph escalator which is probably used that larvae deposited on the skin round the bite die and that only those deposited deep in the puncture can go through the tissues.

B. RAMAMURTI believed that the infective larvae followed the lymphatic route and that the whole of the pathology and symptomatology of the disease was due to the worm itself—to its excretions when alive and to its disintegrating products when dead. There was no specific treatment but strict prophylaxis preventing further doses of infective larvae gave good results.

R. MAHADEVAN remarking that filarial infection was by no means rare in childhood showed elephantiasis of the penis of two years standing of a boy of 13 urged that minute and frequent traumata occur from walking barefoot on an elephantoid leg and suggested that when there is elephantiasis without a history of fever it is because the fever has been forgotten. Frank haematuria may bring patients for treatment so may intermittent haematospemia such as came on in a young man six months after removal of an elephantoid scrotum. Fat should not be excluded from the diet of a chyluric patient for he is losing much of what he should have retained. An early elephantoid penile skin is better than any skin graft yet it may later ulcerate. Acute streptococcal funiculitis may mimic strangulated hernia and needs incision and filarial orchitis may mimic malignant disease. lymph scrotum may pass on into an elephantoid condition† and chylous hydrocele may be the only filarial sign.

W. V. S. KAMESWARA stressed that the infection may be symptomless and may account for 15 per cent. of hospital admissions in endemic areas. He believed that infective larvae entered the skin through the mosquito puncture, noted the constancy of the height of the nightly

* Looss wrote of the infective hookworm larvae with their thickness of 24 μ that they "are not seldom found in the pulmonary veins (photo 31 Pl. XIX)." *Anatomy and Life History of Archylostoma duodenale* Part II p. 361 (1911).

† I have operated on over 100 cases of elephantiasis of the scrotum large and small, and the early history of many of these was that of lymph scrotum. *The Filaria Sanguinis hominis* (1883) p. 101. Patrick Manson.

microfilarial blood tide pointed out that when the filaria is delivering her young every day numbers are being killed in some mysterious organ, and discussed drug treatment.

RAY in his summing up noted the speakers' agreement that the adult worm was the root cause of the pathological change in the host.
C. L.

RAY (P. N.) Surgical Complications of Filariasis.—*Indian Med Gaz.* 1941 Apr Vol 76 No 4 pp 194-199 With 7 figs. on 1 plate. [11 refs.]

See abstract of his paper in the symposium on surgical complications of filariasis which covers the same general ground C. L.

WOODMAN (H. M.) & BOKHARI (Ahmed) Studies on *Loa loa* and the First Report of *Wuchereria bancrofti* in the Sudan.—*Trans. Roy Soc Trop Med & Hyg* 1941 Sept 9 Vol 35 No. 2 pp. 77-82 [23 refs.]

The occurrence of *W. bancrofti* is for the first time reported in the southern part of the Anglo-Egyptian Sudan, where 15 per cent. of the population shows infection by *Mf loa* and where the probable percentage is 20 if hidden cases are taken into account. This latter infection is believed to be the essential local cause of commonly recognized filarial symptoms.

After examining more than 1,500 blood films taken by day and by night, *Mf bancrofti* was discovered in this area in 1937 and during that year and the next some dozen cases came to light. These microfilariae had the typical morphological appearance and were confirmed as such by Professor LEIPER. Three cases of the non-periodic form were discovered the remainder showing nocturnal periodicity, more often than not there was *Loa* infection as well—in no case of elephantiasis, lymphatic varix, varicose groin glands, or hydrocele was either the adult or the microfilaria found (? locally), nor was acute lymphangitis of the filarial type or elephantoid fever seen.

Of British and Syrian officials 23 per cent. were known to be infected with *Loa loa*. There has been no opportunity of dissecting *Chrysops silacea* but specimens have been preserved for sectioning. Of 600 wild *C. distinctipennis* dissected, four were found infected. With difficulty were specimens of this species induced to feed on infected volunteers and when they did, development of the embryos was slower than was noted in *C. silacea* and *C. dimidiata* by CORVAL and CORVAL [this *Bulletin* 1922, Vol. 19 p. 654]. Infectivity was seemingly reached on the 12th to the 16th day; the developmental rate was irregular. Insects lived as long as that only, if they had been induced to take food once or twice more and none with mature embryos would feed after the twelfth day. The larvae were concentrated almost exclusively in the abdomen up to the ninth day; later they collected in the head. No fly lived long enough for embryos ingested at a second meal to mature. No other vectors were traced. Variations from the typical structure of microfilariae are these:—

"The nuclei of the central column of cells were notably larger and more prominent in the first two rows of the cephalic end. The first row was often of three long nuclei roughly parallel but showing variation in their position in relation to one another, a lateral one usually being furthest forward. It was not uncommon to find one or more of these well forward, leaving very little of the typical clear space, that faintly stains without nuclei, of the classical descriptions.

The dispositions though often irregular and thus typical, were also quite often in neat circles

The tail tip was long tapering and fairly frequently but by no means always typically flexed. The nuclei varied considerably in how far they extended into the tail in a single line (There was never any disposal of two detached nuclei in a background faintly stained towards the tip as in *Mf malayi*)

The sheath occasionally took up Geimsa's stain

Relative measurements from the Anterior V spot to the cephalic tip and from the V spot to the tail spot showed divergences from the classical text book measurements.

Comparison of 72 night slides with day bloods taken in the same cases showed that the microfilariae were not diurnal. In some they were present in equal numbers at all hours but usually fewer were seen at, say 9 p.m. In only 9 per cent. of cases were the microfilariae absent entirely up to 12 p.m. Bloods that swarmed by day usually showed a clear reduction in numbers at night.

In the discussion on drug treatment it is concluded with HISSETTE that it is doubtful if any drug will be found to destroy microfilariae of any filarial species and to spare the host. An instance is given of a European in whom Calabar swellings appeared after four months exposure but no microfilariae had been seen during the next seven years in him eosinophilia reached 73 per cent. Worms crossing the conjunctiva were easily killed by novocain one in an eyelid becoming cretified. Hydrocele is the outstanding surgical condition with fluid nearly always clear with chylous cloudiness only when there was scrotal elephantiasis *Mf volvulus* being found once in a smear from the wall of the tunica vaginalis and apparently no other microfilaria except occasional *Mf loa* haematocoele was rare. Inguinal hernia was frequent though the tribe was robust at operation it was common to find adult *L. loa* moving about especially among the blood and lymphatic vessels of the cord and three times one was found in the lymph varix which is common there [whether or not within a lymph vessel is not clear] but on no occasion were adults or larvae of *W. bancrofti* discovered there moreover the distribution of *Loa* seems to correspond to those African areas where hernia is commonest. Elephantiasis is not very common and the only sites are the scrotum vulva or leg. When enlarged lymph nodes were removed during hernia operations there was on section slight endothelial proliferation in lymph vessels microfilariae were found in 2 of 20 sections but round them there was no fibroblastic or giant cell reaction in any way comparable with that described by Clayton LANE [this *Bulletin* 1937 Vol 34 p 885] for *W. bancrofti* the enlargement of the nodes being caused by simple chronic fibrosis nodes from cases of elephantiasis were not examined these lesions are believed to be caused by *Loa*. Avian filariasis was also investigated. C. L.

VARGAS (L.) *Simulium lane portoi* n.n. (Simuliidae Dipt. y lista de simúlidos mexicanos. [Mexican Simuliidae.]—*Rev Inst Salubridad y Enfermedades Trop Mexico*. 1941 June. Vol. 2. No. 1 pp 115-122. [14 refs.] English summary (7 lines)

FAUST (Ernest Carroll) THOMAS (E. Perry) & JONES (Jack) Discovery of Human Heartworm Infection in New Orleans.—*J Parasitology* 1941 Apr Vol 27 No 2, pp 115-122. With 2 figs.

Dissection of the body of an aged negress, a native and life-time resident of New Orleans La. has resulted in the recovery of a single adult

male filaria from a blood clot in the inferior vena cava. The failure to find any females or microfilariae suggests that the male was the only worm that had developed. There was no evidence indicating that the heartworm infection had produced any pathology.

The measurements of this heartworm, together with the character of the preanal and postanal papillae and the structure of the copulatory spicules, indicate that on morphological grounds the worm is specifically different from the common heartworm of dogs (*Dirofilaria immitis*) from *D. immitis* from *D. percyi* and from *D. megakalon* the only previously reported heartworms of mammals. Based on these criteria this worm is designated as *Dirofilaria louisianensis* n. sp.

This woman's body came under examination on the dissecting table showing evidence of acute toxic nephritis and a pericæcal abscess. The other infection from man was discovered by MAGALHÃES (and was named after him by BLANCHARD). It consisted of a male and a female worm found in the left ventricle of a boy living in Rio de Janeiro. For parasites, each found once only in man, there must be reservoir hosts but they are unknown. The new parasite is described in detail and pictured. It is 120 mm long. A table shows certain diagnostic differences between the six known species of the genus.

C. L.

BROWN (H. W.) & SHELTON (A. J.). Treatment of the Canine Heart worm (*Dirofilaria immitis*) with Fovadin and Sulphanilamide.—*Jl. Amer. Vet. Med. Assoc.* 1941 June Vol 88 No. 771 pp 477-481.

A combined sulphanilamide and fovadin course of treatment continued for ten days is effective against the canine heartworm *Dirofilaria immitis*. Five of the dogs so treated were rendered free of microfilariae as judged by stained preparations of 0.1 cc. of peripheral blood. The sixth dog given the combined treatment had its microfilariae count reduced 96 per cent."

The sulphanilamide was given twice a day by mouth in pill form, 4 to 5 grams daily for each kilo of body weight. the fovadin was injected intramuscularly for four days 1 cc. and for six days 1.5 cc. daily into dogs weighing 11 to 15 kilos. the corresponding doses given to dogs of 20 kilos being 1.5 and 2 cc. All the five dogs that were made free of microfilariae were killed and examined on day 22. In three no worms were found, on the fourth there were six living males and 12 living females in the right ventricle. in the fifth there were twenty worms, some living, some disintegrating in the right ventricle and pulmonary artery. Examination of several female worms from each group failed to reveal the presence of larvae. In the sixth dog, the one that still had microfilariae in the blood, no worms were discovered in the heart or pulmonary artery. As to this it is suggested either that circulating microfilariae may survive the death of their mother or that the adults in the heart were missed, which is deemed not unlikely since there were few microfilariae in the blood or that the adults were in some other part of the body.

C. L.

TEIXEIRA (Paulo Q. T.). Granulomatose do apêndice por *T. trichinra* [Granuloma of the Appendix caused by *T. trichinra*].—*Ana. Paulista Med. e Cirurg.* 1941 Feb Vol 41 No. 2 pp. 151-152. With 2 figs.

A boy of 14 had had for a year pain in the right iliac fossa and nausea vomiting and headache for which his appendix was removed.

Microscopic sections showed an infiltration of the mucosa and sub-mucosa by eosinophils. The abundance of these last suggested further examination of certain nodules in the appendix and in one of them there was found what was thought to be the disintegrating head of a whipworm

C L

CRAM (Eloise B) *Studies on Oxyuriasis IX. The Familial Nature of Pinworm Infestation.*—*Med Annals* 1941 Feb Vol. 10 No 2 pp 39-48

The Senior Zoologist National Institute of Health U.S. Public Health Service points out the unique character of threadworm infection and summarizes the features that make for its familial distribution

There is the escape of the female worm from the anus before she starts oviposition the immediate birth of some 11 000 eggs with her death the development of the eggs to infectivity within 6 hours their transport by air to objects that later come into contact with the hands and body of those in the house. The findings are then summarized in 1,525 members of 320 families examined by 5 539 NIH swabs. Of 286 white families only a quarter showed a single member infected in 34 negro families more than half did so. In nearly half of the white families all the children examined showed the infection in about half of them one or more adults also were infected. This frequent familial distribution is of great importance in treatment and prevention

As explaining a difference of wording between the title and substance of the paper it is pointed out that a preliminary note under this title was presented before the Annual Meeting of the American Society of Tropical Medicine in 1937 since when the American Society of Parasitologists has advised the use of the word infection in place of infestation [a welcome change] [See also this *Bulletin* 1941 Vol. 38 p 524]

C L

CRAM (Eloise B) JONES (Myrna F) & REARDON (Lucy) *The Incidence of Pinworms (*Enterobius vermicularis*) in Various Population Groups*—*Rev Med Trop y Parasit* Habana 1941 Jan.-Apr Vol. 7 No 1 & 2 pp 4-6 [11 refs]

This paper reviews previous reports on the incidence of pinworms found in various population groups as the result of NIH swab examination. The findings from examination of three additional groups of persons are recorded

One group represented a sample of the Latin American population of Tampa Florida a single swab was furnished to each of 438 school children for use at home. While this procedure was admittedly very inadequate for the detection of all cases examination revealed pinworm eggs on 16 per cent of the swabs. The other two groups were composed of institutionalized persons in one case white women in a mental hospital in Georgia and in the other case white boys in an orphanage in Washington D.C. The results of these examinations, with positive findings in 83 of 165 women and in 14 of 17 boys furnish additional evidence that *E. vermicularis* may be extremely prevalent under institutional conditions.

BACIGALUPO (Juan) El método del "hisopo" en el diagnóstico de la oxiuriasis. Resultado de los exámenes parasitológicos realizados en los niños del Jardín de Infancia Mitre en el año 1940. [The Swab Method in the Diagnosis of Enterobius Infection. Results of Examinations for Parasites in Children during 1940].—*Semana Méd* 1941 Aug 7 Vol 48. No. 32. pp 308-313. With 7 charts & 2 figs

Examination was not by the NIH swab but by a wisp of cotton wool, wrapped round a glass rod, moistened in normal saline rubbed gently on the perianal skin and then rubbed on a slide with more saline added

With this was compared the collection of adult worms and of eggs recovered from faeces after an aperient and of eggs from the nails. The positive percentages in Buenos Aires were—perianal swab 34.23 adult worms in faeces 18.57 eggs in faeces 4.28, eggs under nails 2.85. The total percentage found infected, in the group of 388 children was 42.1

C. L.

WAX (W. V.) & COOPER (N. S.) Oxyuris Vermicularis Appendicitis. The Incidence of Oxyuris Vermicularis in a Series of 1,016 Cases of Appendicitis.—*Amer. Jl. Surgery* 1941 Apr Vol. 51 No. 4 pp 88-91. With 2 figs

Of these 1,016 appendices removed for appendicitis and all examined microscopically *Enterobius vermicularis* was found in eight.

C. L.

JONES (Myrna F.) & JACOBS (Leon) Studies on Oxyuriasis. XXIII. The Survival of Eggs of *Enterobius vermicularis* under Known Conditions of Temperature and Humidity.—*Amer. Jl. Hyg.* 1941 May Vol. 33 No. 3 Sect. D pp 88-102. With 5 figs.

These conditions were studied in great detail. It was in general the case that, when eggs were kept in fairly uniform surroundings for from 42 to 48 hours the percentage of survivals in moist cool air was nearly 70, in dry cool air about 10, in moist warm air less than 10, in dry warm air 0.

"These studies emphasize the great variation in survival under varying conditions and especially the importance of temperature and humidity in connection with the time of survival. The value of relatively dry atmospheres and high temperatures in connection with control measures is indicated."

C. L.

KUTIKEN EKRAHM (E.) Phenothiazine in the Treatment of Enterobiasis.—*Canadian Public Health Jl* 1941 June Vol. 32 No. 6 pp 306-313. [1 refs.]

"From this preliminary trial the conclusion may be drawn that phenothiazine is of definite value in the treatment of enterobiasis. It is easily administered without laxatives, enemas, or fasting. It is effective in eliminating pinworms and it has apparently no adverse reaction in the patient if administered in moderate doses."

Summary

"Phenothiazine was administered to 89 children and 9 adults infected with pinworms. The ages of the children were as follows: 24 children from 2 to 5 years of age, 31 children from 6 to 8 years, and 34 from 9 to 14 years of age."

Adults received from 5 to 10 grm of phenothiazine and children from 2.5 to 8 grm. Eight adults and 76 children were cured by the first course of treatment. The swabs of one adult and 13 children remained positive after the first course of treatment. Nine of the 13 children were from 2 to 5 years of age and 4 were from 9 to 14 years of age. All responded to the second course of treatment except a 4-year-old child whose swabs were still positive after the second course of treatment. From 2 children no post treatment swabs were taken.

LANCET 1942, Jan 17 p 86 Medicine and the Law A Death after Phenothiazine

The patient, a girl of 6 healthy but suspected of threadworm infection was given 3 half gramme tablets of phenothiazine on the first day 4 on each of the next three days and 2 on the fifth day a total of 8.5 gm. By this time the child had become pale and slightly yellow and complained of headache. Later she vomited and on the 11th day was sent into hospital with a temperature of 101 F. The blood count showed 1,250,000 red cells haemoglobin 26 per cent. normoblasts 1 per cent. reticulocytes 22.6 per cent. platelets 236,000 and leucocytes 16,850.

She was given a drip transfusion of 10 oz blood, which was followed by a rigor thereafter she became unconscious and died. In the brain were found multiple small haemorrhages in the region of the corpus callosum there was no evidence of toxic damage in liver heart or kidneys but the appearances of the blood spleen and marrow were consistent with haemolytic anaemia. There was no indication that blood transfusion had caused death.

[In view of recent reports that phenothiazine can be used with safety it is well that this case should be brought to the notice of medical practitioners. See also this *Bulletin* 1942 Vol. 39 p 6 for dosage in children and for toxic effects in horses.] C. H.

LEVIN (Arthur J.) Recovery of *Trichinella spiralis* Larvae in Early Stages of Infection.—*Jl Parasitology* 1941 Apr Vol 27 No 2 pp 107-113 With 1 fig [10 refs.]

Larvae were recovered from the bodies of albino rats 11 to 20 weeks old into whose empty stomachs had been pipetted 30 larvae per gramme of body weight. Larvae of the next generation were obtained from their muscles by grinding these up and placing 25 grammes of the pulp in 60 cc. of 0.9 per cent saline and shaking it up in a 500 cc. Erlenmeyer flask with glass beads for three or four minutes. After double filtration saline was again poured into the flask through the cloth and the fluid was again filtered. A known fraction of the total filtrate was examined on a marked slide.

Because larvae do not become encapsuled in muscle till four weeks after infection they can up till then be recovered from ground-up muscle without the use of pepsin which is apt to digest them. After infection larvae first appear on day 6 and since their numbers per gramme do not increase after day 12 it is concluded that only within that period do they enter muscles though adults are found in the

intestine up to day 16. There are great variations in the number of these second generation larvae after the same numbers of first generation larvae per gramme have been administered to rats. C L

WYRENS (Rollin G.) TILLISCH (Jan H.) & MAGATH (Thomas B.) Trichinosis. Report of Nineteen Cases of Clinical Infection and Twenty-One Cases of Asymptomatic Infection.—*Jl Amer Med Assoc* 1941 Aug 9 Vol 117 No. 6 pp. 428-432 [12 ref]

Asymptomatic infection with *Trichinella spiralis* and clinical trichinosis are conditions which should be kept separate.

The clinical symptoms observed in these persons were much as usual, but none pointed to cardiac involvement and in all eosinophilia persisted longer than leucocytosis. Asymptomatic infection was discovered in routine examinations of surgical pathological material at the Mayo Clinic.

In 12 cases the parasite was found in muscle during routine examination of tonsils, in 2 it was found during examination of thyroid tissue, in 4 it was found during examination of tissue from the hip, in 1 in a mass in the biceps, in 1 in a specimen of lumbar muscle removed at nephrectomy and in 2 in muscle overlying a cyst of the jaw.

In none of these could a history suggesting trichinosis be obtained.

C L

DAMMIN (Gustave J.) Trichinosis. Report of a Case, with Demonstration of the Larva in the Arterial Blood.—*New England Jl of Med* 1941 Feb 27 Vol 224 No 9 pp. 357-360 With 2 figs 10 refs

Sixteen days after eating some uncooked imported smoked ham, a German-born man suffered from fever, malaise and puffy eyelids and had a 15 per cent eosinophilia. Capillary and venous blood displayed no trichinella larva, but one was found in 5 cc. of blood drawn by puncture from the brachial artery. This procedure is advised for diagnosis.

"During the course of observation agglutinins to typhoid H (formalin-killed) antigen and typhoid O antigen developed from initial titers of zero to agglutinations in serum dilutions of 1:640 and 1:1,280 respectively."

"The initial skin reaction to National Institute of Health trichina antigen (1:10,000) was of the delayed positive type. This was followed by two negative reactions, the latter of which was performed two months after exposure."

C L

McVARGHY (J. B.) BEARD (R. R.) & MYERS (J. D.) The Diagnosis of Trichinosis by Skin and Precipitin Tests.—*Amer Jl Clin Path* 1941 Mar Vol 11 No 3 pp. 185-209 With 3 figs [19 refs]

The antigen for the cutaneous and precipitin tests is prepared as follows:—

"Adult white rats are infected by doses of about 20 trichinella larvae per gram, either as free larvae by stomach tube or by eating trichinous meat. The strain of *T. spiralis* was isolated from a human diaphragm and is kept alive in the rat colony. After about 5 weeks the infected rats

are sacrificed skinned eviscerated and ground in a meat chopper. The meat is digested and the larvae liberated in 6 to 12 hours by agitation in an aqueous solution of 1 per cent. pepsin and 0.7 per cent. HCl in a 37.5°C. incubator using about a liter of solution to each 100 grams of meat.

The digest is passed through a sixty mesh sieve to remove undigested soft tissues and bone and placed in large (2 liter) glass funnels fitted with rubber tubes and pinch cocks. The larvae settle rapidly are drawn off into round glass jars of 200 cc capacity which are then covered by 4 layers of wet cheesecloth held in place by rubber bands and inverted into conical sedimentation glasses filled with tap water. These are placed in the incubator for a few hours until the motile larvae have passed through the cloth and settled to the bottom leaving practically all the debris behind. The jars and supernatant fluid are removed and the larvae from all of the glasses are transferred to a 50 ml conical centrifuge tube and washed in tap water until the fluid is clear. Following centrifugalization a small amount of fine debris is sometimes found overlying the larvae this is readily removed with a capillary pipette. Three or four washings are usually sufficient to leave a clear supernatant fluid giving a negative biuret test.

After removing the excess water the tube of larvae is rotated in a salt-ice or carbon dioxide snow bath until the mass is frozen solid over the inside of the tube. The tube of frozen larvae is placed in a vacuum desiccator containing calcium chloride and dry NaOH the air evacuated with a high vacuum pump for a half hour and then sealed. When these procedures are carried out properly the larvae remain frozen until dehydration is complete. After about 18 hours in the desiccator the thoroughly dried flaky mass is removed and placed in glass vials in weighed amounts sealed by flame and kept for future use. It was found important that the drying of the larvae be hastened as much as possible because slow drying allows the growth of bacteria causing loss of specificity in the finished antigen. The freezing technic eliminates this difficulty.

Early in our investigations dried larvae were extracted with ether for 12 to 24 hours the ether decanted and the residue dried and weighed before extraction. This step was eliminated after observing no differences in the tests made with ether-extracted and non-ether-extracted antigens.

Extraction is carried out by mixing buffered saline solution (0.5 per cent. NaCl 0.143 per cent. Na_2HPO_4 0.036 per cent. KH_2PO_4 and 0.4 per cent. phenol at pH 7.1) and a weighed amount of dried larvae to a concentration of 1:100. After 12-18 hours in the refrigerator the suspension is placed in a ball mill (a 250 cc centrifuge flask half full of 5 mm steel balls) and slowly revolved over night in a horizontal position.

The turbid solution from the ball mill is now cleared by centrifuging for 1 to 2 hours at the highest available speed. Maximal trituration in the ball mill long high speed centrifugalization and the phenol of the extracting and diluting fluid produce a sterile antigen as checked by bacteriological methods.

After testing for sterility the antigen in 1:100 dilution for precipitin tests and 1:10,000 dilution for skin tests is placed in sterile 2 ml. vaccine vials with rubber stoppers having thin diaphragms readily punctured by an hypodermic needle. Similar vials of sterile buffered saline solution are prepared for controls. Antigen kept in a refrigerator has shown no noticeable deterioration for at least a year.

For the intradermal test the forearm is cleansed with alcohol and dried. 0.1 ml of 1:10,000 dilution of antigen is injected, a control solution of buffered saline being injected in another spot with another syringe. A blanched area appears at each site the control disappears the test area in a positive case forms an itching wheal reaching a maximum in 20 minutes the wheal is in a definite case 7 mm. or more in diameter with an erythematous zone to 20 mm. This is the immediate type of reaction and may have disappeared entirely in 24

hours. Some persons (see below) show a *delayed* type of reaction reaching a maximum in 24 hours as a slightly swollen tender red area 1-3 cm in diameter.

Of 36 persons ill with the classical symptoms of trichinosis 35 gave the *immediate* type of response (the other patient was moribund). The *delayed* type occurs in the early stage of infection and in long standing quiescent cases.

For the precipitin test 0.2 ml. of a 1/100 dilution of antigen is layered over by the same amount of clear unactivated serum in a 7 mm. wide thin-walled serological tube—a control with saline is also set up. After an hour in a water-bath at 37.5°C. an opaque whitish disk appears at the junction of the fluids in positive cases. It may appear in a few minutes at room temperature. Chylous or haemolysed sera are not suitable for testing.

Both the intracutaneous and the precipitin tests may be used with success years after the initial infection. H H S

MAUES (Evalyn Abrams) Occurrence of Forssman Heterogeneous Antigen in the Nematode, *Trichinella spiralis*—*Jl Immunology* 1941 Sept. Vol 42. No. 1 pp 71-77

BENSON (Paul B) Trichiniasis. Clinical Manifestations and Diagnosis. *Lancet*. 1941 July 19 pp 67-69 [20 refs.]

The Physician to the American Red Cross Harvard Field Hospital Unit, Salisbury surveys the subject and points out that accurate diagnosis will be more frequent when medical men realize the many possible variations of the disease—and to stress this point he cites a family in which seven cases occurred and were diagnosed as influenza, mumps, encephalitis, typhoid fever and acute alcoholism.

The infection transmitted by pork or by pork sausages is rarely recognized clinically. In one American outbreak from one meal the incubation periods lay between 9 and 20 days. The symptoms are fever nearly always, oedema of orbit and of the lower part of face of conjunctiva (chemosis) of scrotum, over sacrum and over painful and tender muscles. sublingual linear haemorrhages are almost pathognomonic. skin eruptions morbilliform, urticarial or nodular. hypotension is common and in one case was as low as 44/18 mm Hg. electrocardiographic changes showing as flattening and inversion of the T wave in lead 2, low amplitude of the QRS complex, and evidence of intraventricular block. there being interstitial myocarditis with larvae in the muscle, though they do not get encysted there. lesions of the central nervous system may dominate the picture suggesting meningitis or encephalitis. gastro-intestinal symptoms occur in less than half those with clinical infection. absence of blood and mucus from the stool is useful in pointing away from dysentery. cough and pain in the chest are frequent. enlargement of the spleen is fairly common, of lymph nodes rare. In recent epidemics the death rate has been less than 5 per cent. and for survivors complete recovery is the rule.

In diagnosis search for the adult in the faeces is usually a waste of time. search of the blood for larvae should be done oftener than it is, by taking 5 cc. of blood in 50 cc. of water centrifuging and examining the sediment under a low power. after the third week muscle biopsy should be undertaken, by removing about 1 gramme making a squash

preparation of about a half and sectioning the rest eosinophilia in the second and third weeks usually lies between 15 and 40 per cent and lasts for three months but may persist for 12. Immune reactions have been found in 10 per cent of routine examinations made in the U.S.A. but such a reaction appearing where there had previously been none is of real value in diagnosis. The delayed skin reaction is usually present for a few days only about the end of the second week the delay amounting to 12 or 24 hours the immediate reaction comes on within 10 minutes of making the test appearing from the third or fourth week and possibly obtainable for months or years. Precipitin tests begin to be positive at the time skin tests do and are useful if the latter are equivocal. Sometimes there is a positive Widal reaction during the acute stage. X rays can seldom or never display calcification of cysts these being too small but cysticercus cysts have probably been mistaken for them.

C. L.

DELLA VIDA (B. L.) & DYKE (S. C.) Blood-Picture in Trichiniasis.
—*Lancet* 1941 July 19 pp 69-71 With 1 chart

The blood picture has been followed in about 100 patients suffering from infestation with *Trichinella spiralis*. The following points were observed.

Leucocytosis occurs in a primary wave reaching its peak at about the third week from onset of symptoms and a secondary wave reaching its peak at the eleventh week.

The eosinophils diminish or may disappear within the first three days from onset of symptoms thereafter they increase in primary and secondary waves coinciding with those of the general leucocytosis.

The neutrophils diminish during the waves of general leucocytosis and increase as the eosinophilia diminishes.

The monocytes increase with the first diminution in the eosinophilia.

In addition to true eosinophil cells neutrophils bearing within their cytoplasm greater or lesser numbers of eosinophilic (acidophilic) granules may appear especially in the early stages of infestation.

C. L.

MISCELLANEOUS

SCHAEFFER (C. O.) Onderzoek over de herkomst van typhusbacterien voorkomend in het rioolings-systeem van Bandoeng [Typhoid Bacilli in the Sewage System of Bandoeng]—*Geneesk. Tijdschr. v. Nederl. Indië* 1941 July 22. Vol. 81 No. 29 pp 1535-1547 With 1 fig.

It had been maintained that the presence of typhoid organisms in the sewage systems of Batavia and Bandoeng was due to their multiplication in sludge deposit or to their derivation from animals living in the sewers such as rats cockroaches &c. and not simply to their presence in human faeces. Proof to the contrary is forthcoming by showing that the number of the typhoid bacteria found in the sewage is exactly correlated with the content in human excreta. Samples of sewage were taken from different places in the system and also from the same

place at different times. The conclusion is drawn that "the typhoid bacteria which are found in the sewage must be of human origin and are deposited there with faeces and urine"

W F Harvey

VERHAART (W J C) Cerebral Disorders in Infants and Children at Batavia. A Record of 1 405 Cases.—*Geneesk Tijdschr v Nederl Indië* 1941 July 8 Vol 81 No 27 pp 1430-1484 [68 refs]

This is an important paper from the point of view of clinical medicine in that it indicates those diseases which should be expected in children who show signs of cerebral disorder and from the epidemiological point of view in that many of the conditions are of public health importance. It is a record of cases seen in the neurological department of the School of Medicine Batavia, in the 9 years 1932 to 1940 inclusive. The 1 405 cases include 2 main groups—the meningitides (368) and the encephalopathies (1 037). In the first group 180 or about one half, were due to tuberculous meningitis, and it is pointed out that the clinical picture in this disease is very variable. In diagnosis the tuberculin test and X-ray of the lungs may be necessary in addition to lumbar puncture. Pneumococcal meningitis was more common than the meningococcal form.

Of the 1 037 encephalopathies the main group consisted of 318 cases in which the cause could not be determined. The next largest group comprised 180 cases of bacillary dysentery with cerebral intoxication in which the commonest sign was convulsions and in which 143 cases were fatal. Encephalopathy consequent upon pneumonia accounted for 152 cases and 116 deaths—that accompanying enteritis and dyspepsia for 82 (66 deaths) and 86 (76 deaths) respectively. Lead encephalopathy was seen 53 times (39 deaths) all the cases except one being in Chinese infants under two years of age. Diagnosis in this condition depends on the chemical analysis of urine and cerebrospinal fluid, and on X-ray examination of long bones, together with knowledge of the possible source of the lead. Birth injuries and congenital malformations account for 38 cases, typhoid fever for 17 and sepsis for 23. Subtertian malaria was responsible for only 13 cases, poliomyelitis for 11 the infectious fevers for 28. There is a group of 6 in which the encephalopathy is attributed to dietary deficiency, one of 9 in which icterus neonatorum is implicated, the remaining few cases are attributed to syphilis and to certain rare conditions.

Descriptions of the clinical course and, in some instances, of the pathological findings, are given in a number of cases and treatment is briefly touched upon, especially as regards relief of raised intracranial pressure and the prevention of convulsions. The paper is too long for more than brief abstract but should be consulted in the original (fortunately written in English) by those desiring fuller information.

C II

LOE PING KIAN Een geval van lood-encephalopathie bij een Chineesche zuigeling. Lead Encephalopathy in a Chinese Infant.—*Geneesk Tijdschr v Nederl Indië* 1941 Aug 5 Vol 81 No 31 pp 1667-1673 With 1 plate English summary (8 lines) (Summary appears also in *Bulletin of Hygiene*)

The case is reported of a child, 7 months old, suffering from plumbism. The poison had been ingested owing to the habit of the mother of

using a preparation known locally as *yok san merah* as an application to the buccal and lingual mucosa to prevent aphthae. This is a red powder and contains both lead and mercury one of the constituents being *tyoseh* which is mercuric sulphide (*cinnabar*). It is a matter for wonder that cases of poisoning are not more numerous as the preparation is a popular household remedy among the Chinese in Java (VERHAART (above) has recently reported 53 cases of lead encephalopathy 39 of them fatal seen among infants attending the Neurological Department of the School of Medicine Batavia in the nine-year period 1932-40. The condition would, therefore appear to be far from uncommon there.]

H H S

RAO (B Tirumal) & MENON (T Bhaskara) A Study of Rhinoscleroma in Vizagapatam.—*Indian Med Gaz.* 1941 June Vol 76 No 6 pp 321-323 With 8 figs on 2 plates [12 ref.]

Six cases of this condition are reported by the authors with brief details of each four were males between the ages of 24 and 40 years and two were females of 45 and 50 years all were Hindus. In four the characteristic histological changes were seen and the organism *Klebsiella rhinoscleromatis* present. In one case culture was tried with success. The condition is shown by four good photographs of three of the patients and an equal number of photomicrographs demonstrate the organism and changes in its morphology together with the histological appearances. Treatment is not very satisfactory though radium bromide or roentgen rays may benefit. The general health was little if at all affected.

H H S

FISHER (A C) Acute Thrombophlebitis of Unknown Aetiology.—*South African Med J* 1941 Apr 12 Vol 15 No 7 pp 131-139 With 4 figs

The author reports 21 cases of this condition in the copper mining area of N Rhodesia where it is becoming increasingly frequent. The cases had so much in common that they suggest a common underlying cause which, however is still unknown. There were 19 natives and two Europeans in the group. After a few hours of malaise the temperature rises and within 24 hours there is severe pain over one of the larger veins with tenderness and muscle spasm. Oedema appears distal to this area and from about the fourth day the thrombosed vein may be palpable. The temperature usually falls by lysis about this time the oedema gradually disappears and the vein becomes soft and impalpable. If a second vein becomes involved recrudescence of the pyrexia is observed.

The leucocyte count is typical of an acute infection and the sedimentation rate is increased. The Kahn test was negative in the cases observed. Embolism and suppuration were not observed, and the complications were only those which might result from clotting of veins in special areas such as the splanchnic. Differential diagnosis must be made from tropical myositis. Death occurred in three cases in which there was either splanchnic or cavernous sinus thrombosis. The treatment given was conservative and palliative. Details of the cases are given.

The veins affected were widely different cavernous sinus jugular subclavian axillary basilic, femoral popliteal saphenous and veins

features of the disease is given and a reference is made to tularemia in sheep. Q fever is another human disease transmitted by *D. andersoni*. There is a description not new to readers of this *Bulletin* of tick paralysis in man also caused by *D. andersoni* and to the same condition in animals. C 15

MACGREGOR (R. G. Scott) & LOH (G. L.) The Influence of a Tropical Environment upon the Basal Metabolism, Pulse Rate and Blood Pressure in Europeans.—*Jl Physiology* 1941 June 30 Vol. 99 No. 4 pp 496-509 [29 refs.]

The evidence which has been accumulated on this subject indicates that a depression in the basal metabolic rate is a common reaction in those going to a tropical climate from temperate zones. Concerning changes in the pulse rate, observations made by earlier workers have led to the general impression that the rate increases at first but decreases with residence and that acclimatization is a factor which has been held to be responsible for this. The systolic and diastolic blood pressures are generally regarded as being lower in tropical circumstances than in temperate although it is not wise to accept as definite evidence averages found by different observers where the method of measurement is not standardized to a greater degree.

The present paper records observations of both basal metabolic rate and blood pressure carried out upon Europeans resident for varying periods in Singapore. The subjects were soldiers living in barracks and were divisible into two groups. One group consisted of 35 subjects whose residence in the tropics had not exceeded six months and the other of 35 who had been in the tropics for 2½ years. The groups were closely comparable with each other in respect of diet, exercise and occupation, and similar in physical data. All the subjects were in a good state of health and there was no evidence to indicate that the group which had been resident in the tropics for 2½ years was in any way less fit than the group which had been less than six months in Singapore. It should be pointed out however that the group with longer residence in the tropics had been under army training for over 2 years while a certain percentage in the other group had only recently joined the unit from civilian life.

The experimental procedure was as follows. All subjects were conveyed to the laboratory by car after a night's rest and without food. They then spent a preliminary period resting on camp beds and strict supervision was kept to ensure complete rest and quiet. Two basal metabolism measurements were made upon each subject on four separate days. The pulse rate and blood pressure were also measured with the subject in the basal and post-absorptive state. Of the two daily metabolism measurements, one was made between the first half-hour and hour and the other during the second hour. A third measurement was made if either was unsatisfactory. Blood pressures were measured by the auscultatory method and the basal metabolic rate was determined with a Benedict recording spirometer. A half face mask was used in preference to mouthpiece and noseclip in view of its greater comfort. Some forty control experiments were performed, using the Douglas-Haldane technique in addition to the spirometer. The results showed good agreement between the two methods.

Basal metabolism showed a definite reaction to tropical environment in certain individuals which was absent in others. The reaction consisted of a gradual fall in the B.M.R. and a corresponding variation in pulse rate and systolic and diastolic blood pressures. The depression in metabolism in those subjects affected appeared to reach a maximum before the end of the first year in the tropics. This lower value is shown to be maintained after 2 years in the tropics and was not affected by a period of military training in the subjects examined. The environmental factors which may influence these values are discussed and it is concluded that climatic rather than dietetic or occupational influences are primarily responsible for the variations noted.

C. C. Warner

BLACKLOCK (M. G.) *Diseases of Women in the Tropics.*—*Practitioner* 1941 June Vol 146 No 6 pp 372-379

The subject of this article is discussed under the headings of diseases associated directly or indirectly with climatic conditions and those attributable to social or economic defects. Native-born women suffer little from diseases due to hot climates and newcomers need not if they adopt suitable living conditions especially as regards exercise and congenial occupation.

Malaria heads the list of diseases indirectly due to climate especially in its effect on maternal mortality and still-births though fortunately the placenta is usually an effective barrier to infection of the foetus. Hookworm and dysentery are widespread. The importance of anaemia in the aetiology of puerperal sepsis has been brought out in a recent survey in Calcutta (1940) in which it was found that 49 per cent of the women who died of sepsis after spontaneous delivery at home suffered from anaemia.

Lack of skilled antenatal and obstetric care gives rise to much ill health and dietetic deficiencies lead to osteomalacia and beriberi.

The health of European women in the tropics has improved greatly in the last two decades as a result of public health measures and a better knowledge of personal hygiene. In a table of vital statistics of European officials in West Africa in 1934-38 while the male death rate varied between 5.2 and 9.3 per 1,000 the rate for women was nil. The invaliding rate amongst women was however appreciably higher than amongst men.

Needs for the future are the extension of maternity and child welfare work and much more attention to nutrition. In the latter connexion attention is drawn to the report of the Committee on Nutrition in the Colonial Empire (1939) Reports I & II (Cmd. 6050-6051).

W. H. Peacock

SNEATH (P. A. T.) *A Study of the Crude Birth/Death Ratio (Vital Index) in British Guiana.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1941 Sept 9 Vol 35 No 2 pp 105-117 With 5 figs.

The author observes that a newcomer to the Colony is faced with such questions as (a) what is the major public health problem? (b) what group does it most affect? (c) where is the problem most serious? and with a view to discovering answers wholly or in part to some of these questions, he undertook a detailed survey of the vital statistics over an extended period of time adopting for purposes of

convenience in this study Pearl's *Vital Index* method of assessment i.e. the ratio 100 Births/Deaths [According to Pearl, when the ratio exceeds 100 it indicates a growing and biologically sound population.*] Dr Sneath is careful to point out that though the Vital Index must necessarily reflect the effects of a variety of known and obscure factors acting alone or in various combinations, it was nevertheless a useful and convenient technical expedient for the assessment of the relative importance and location of epidemiological problems under conditions obtaining in British Guiana.

From 1919 onwards the vital index figure showed gradual improvement with the malaria and infant mortality rate curves in close correlation. But since malaria is seldom recorded in the Colony as a cause of death in infancy it was necessary to test this aspect of the problem yet when the necessary corrections were introduced the trend of the vital index curve was not altered. It seemed evident therefore that malaria and the undefined fevers were the major factors affecting the fluctuations of the index figure and that the improvement indicated by the annual vital index must be associated with either an absolute reduction in the incidence of malaria or the effects of premunition developing in a population that is not now subject to immigration. [It may be noted that the introduction of indentured immigrants ceased in 1920 since when repatriation has resulted in an insignificant depletion of the Colony's population.]

After calling attention to the fact that the significance of endemic malaria as a dominant factor in the crude vital indices was established in 1938 by the extended studies of GIGLIOLI on selected sugar estates in the Colony [see this *Bulletin* 1939 Vol 36 p 940] Dr Sneath next sought to discover which areas might appear to offer the best opportunities for the investigation of the epidemic factors and endemic problems by detailed examination of the crude vital index figures for each county in order that local variation might be determined. Thereafter racial variations were studied, in an effort to show to what extent the imported races have been able to accommodate themselves to prevailing conditions in the Colony. In this connexion Dr Sneath records the interesting finding that the Chinese appear to have accommodated themselves to local conditions to a more satisfactory extent than any other distinctive racial group yet the group designated

Mixed Races presents the most striking feature in this particular branch of the study for the figures appear to substantiate the well-known observation as to the hardihood of hybrids and suggest the probability that in time this group may predominate in British Guiana.

In this interesting and valuable contribution Dr Sneath has succeeded in demonstrating from his studies and use of the vital index that malaria is a dominant factor that the disease occurs in periodic epidemics that there appears to be a possibility of a development in the population of premunition to the prevailing strains of malaria, and that the vital index figures for locality and race afford a convenient means of ascertaining the effect of the Colony's major health problem with regard to these specific factors.

P. Grawville Edge

* See *The Vitality of the Peoples of America* Raymond Pearl *Amer. J. Hygiene* Vol 1 1921 pp 592-674 *Medical Biometry and Statistics* Raymond Pearl 3rd Edn 1940 pp 207-217

REVIEWS AND NOTICES

COVELL (Gordon) [C.I.E. M.D (Lond.) D.P.H., D.T.M. & H. (Eng.) Lt-Colonel I.M.S. Director Malaria Institute of India] *Malaria Control by Anti-Mosquito Measures*. Second Edition. Revised enlarged and brought up to date by the Author—pp xi+224 With 13 text figs & 2 plates 1941 Calcutta Thacker Spink & Co (1933), Ltd. London W Thacker & Co 34-40 Ludgate Hill [12s.]

A review of the first edition of this useful book appeared in this *Bulletin* 1931 Vol. 28 p 1035. During the 10 years that have elapsed the volume of literature that has been published on the subject of malaria control has been prodigious. The bibliography which was a praiseworthy feature of the first edition contained 570 references. The bibliography of the second edition now published, occupies 95 pages nearly half the contents of the book and contains 1148 references.

The first three parts of the book dealing with protection against bites of mosquitoes, measures against adult mosquitoes and measures against larvae of mosquitoes remain substantially unchanged. In the second edition a fourth part treats of the more important advances in malaria control that have been made during the past ten years—this consists of 27 pages.

The book is intended primarily for the practical worker in India. In an appendix is given a list of firms in India who can supply various articles of anti mosquito equipment.

The amount of information that is packed into so small a space is remarkable. Few if any of the methods of malaria control that have been advocated can have escaped mention. Some of these methods are of limited value. If the author had omitted all reference to these and dealt at greater length with those measures of control which his vast practical experience has shown to be most effective the practical value of the book to the field worker might have been enhanced. As it is however the field worker wherever he may be can hardly fail to find in the pages of this small book valuable suggestions as to how the malaria problems with which he is faced might best be solved. The very complete bibliography will certainly be useful to malarialogists.

Norman White

ELLERMAN (J. R.) *The Families and Genera of Living Rodents. With a List of Named Forms (1758-1936)* by R. W. HAYNAN & G. W. C. HOLT. Volume I. Rodents other than Muridae—pp xvi+689 With 189 text figs. Volume II. Family Muridae pp xi+690 With 50 text figs. 1940 8th June & 1941 21st March London Printed by Order of the Trustees of the British Museum [£1 15s. each Volume]

The book is precisely described by its title. It is a strictly taxonomic work which defines the families and genera—an enormous task for 343 genera are recognized (the Duplicidentia i.e. hares rabbits etc. being excluded from the scope of the book). Species and subspecies are not defined or discussed but they are listed under each genus with a reference to the original description and a statement of the type locality. The author also discusses the general lines on which previous

workers have classified the Rodentia and gives an account of their distribution by zoogeographical regions. The volumes contain nearly 250 excellent line drawings of skulls and teeth, and it is understood that a third volume is in preparation to be devoted almost entirely to figures.

To the readers of this *Bulletin* the book will be a valuable referee on systematic questions and will help to standardize the nomenclature of the rodents. Many workers have to know and identify a large number of species of wild rodents which are involved in the spread of sylvatic plague in Africa and other areas, or which act as hosts of *Ornithodoros* and perhaps as reservoirs of the spirochaetes of relapsing fevers.

P. A. Buxton

REVISTA DE COMBATE À LEPROSA Rio de Janeiro. [Review of the Campaign against Leprosy (in Rio de Janeiro)] 1941 Mar Vol 6. 305 pp With 1 chart 1 map & 1 plate

This book is useful as a work of reference. It is the official record of the Federation of Societies to Aid Lepers and to fight against the disease. The chief part of the publication is taken up by brief accounts of the many preventoria or institutions for dealing with lepers in the various States and Departments of Brazil. This and the other smaller contributions are mostly if not entirely of local interest. They include a short account of the disease in Santa Catarina, a census of lepers in a certain district of Minas Geraes, designated Zone A, a brief note on leprosy and marriage consisting of quotations from the work of previous writers and, lastly, the plants which have been introduced and cultivated for the treatment of the disease. Those who wish to know what facilities and institutions there are in the country for dealing with lepers will here find all the information readily put together.

H. H. S.

TROPICAL DISEASES
BULLETIN

Vol 39]

1942.

[No 4

SUMMARY OF RECENT ABSTRACTS *
III MALARIA

[Continued from p 137]

Treatment

REED (p 291) has written a paper on the treatment of malaria which being too comprehensive for abstract should be consulted in the original. In comment, WHITE draws attention to a misstatement of the dosage of plasmoquine

FORBES (p 177) points out that quinine has a predilection for the auditory nerve and states that there is clinical and experimental evidence that quinine administered to the mother during pregnancy may cause deafness or amblyopia in the child. He gives figures which indicate that the taking of quinine over long periods of time may cause nerve deafness but not other forms. LYNCH and BRANDT (p 291) describe a case of accidental quinine poisoning in a child.

WILKINSON (p 337) reports three cases in which mental disturbance followed the taking of atabrin all the patients recovered rapidly. BALLERO (p 34) reports favourably on Italchina, a new acridine derivative stated to be effective against all forms of malaria.

CANNISTRACI (p 33) states that in Messina no relapses occurred in 192 cases of malaria after two courses of atabrin and plasmoquine. In the *Annals of Tropical Medicine and Parasitology* (p 508) are recorded tests which indicate that pamaquin (I.C.I.) is identical with plasmoquine. NANDI (p 645) discusses the respiratory metabolism of certain tissues in the presence of plasmoquine.

The intravenous administration of reconstituted serum produced striking improvement in a patient suffering from severe subtertian malaria, which did not respond to atabrin and quinine. FAWCITT and WALTERS (p 508) in reporting the case discuss the possible mode of action of the serum.

FIELD (p 35) states that Certuna has an effect on gametocytes of *P. falciparum* similar to that of plasmoquine but has no effective action on asexual forms of that parasite or on any form of *P. vivax*. He reports unfavourably on certain other new drugs.

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

twice each week failed to bring about a reduction in the amount of malaria. FIELD (p. 35) reports that large numbers of carriers of gametocytes of *P. vivax* persisted, and that the incidence of infected mosquitoes remained approximately the same as during the previous year when schizonticidal drugs only were employed. KINGSBURY (p. 102) also reports unfavourably on attempts at drug prophylaxis, in which plasmoquine in doses of 0.02 gm., twice each week, were given on an estate in Malaya. The Italian drug M.3 was similarly unsuccessful.

Control

General—KEECHER (503) reports that in the peat bogs of the Province of Moscow where *A. maculipennis* is the vector control by systematic catching of adults in houses, and by the use of oil and Paris green, is insufficient and that medical treatment of the entire population is necessary in the spring.

In the Philippine island of Luzon, where *A. sinensis* is the principal vector McMURDO (p. 333) records the protective measures used by troops on manoeuvres during 1940. Camp siting was realized to be important mosquito nets were systematically employed, quinine was given in daily doses of 5 grains, and Bamber oil was used as a repellent. With these precautions it was found that the malaria records for 1940 were very low in comparison with those of 1938 and 1939. In the Netherlands Indies MOOTJ (p. 512) reports that, for the protection of troops, a recommendation has been made that mosquito screens should be made of wire with a mesh of 1.25 mm. and that mosquito nets should have at least 26 meshes to the inch.

For the labour camps and headquarter towns along the China Burma road WILLIAMS (p. 502) reports that control measures, consisting of subsoil drainage, the use of larvicides (oil, pyrethrum and Paris green), the shading of streams by means of benches and the use of *Gambusia*, should secure adequate protection, and thus remove the main dangers to health which have hindered road construction and the delivery of supplies.

GRANETT (p. 713) has carried out tests on a large number of mosquito repellents and gives information about those found to be useful, the best of which, a proprietary product known as Sta Way Insect Lotion, contains diethylene glycol monobutyl ether acetate and diethylene glycol monoethyl ether with ethyl alcohol, maize oil and perfume. Citronella oil and other preparations are ranked next in efficiency to this product.

STRAHAN (p. 231) points out that in Malaya, where oiling has been carried out conscientiously on estates, reasonable control of *A. maculatus* has not been achieved, and indicates that this is probably the result of a too rigid observance of the half-mile rule. The mosquitoes reach the labour lines from outside the protected zone in numbers sufficient to be dangerous. BARROWMAN (p. 231) however insists that, in spite of criticism as to its adequacy the half mile rule remains the most important starting point in malaria control, but that it must be applied intelligently. He discusses fascine and pipe drainage.

Insecticidal sprays—[Work on insecticidal sprays continues to show most encouraging results. It is a method of prevention which may have great value in military communities in many parts of the world.]

COVRELL (p 228) reports good results from the spraying of dwellings in India with pyrethrum insecticides. WATS and BHARUCHA (p 234) note that for insecticidal spraying to be effective in dwellings which cannot be rendered relatively air tight, the maximum concentration of insecticide must be secured in the minimum of time. They give details of an apparatus efficient in this matter. RUSSELL and KNIFE (p 645) have continued their work on the spraying of dwellings in India with an insecticide of Pyrocyde 20 one part, in nineteen parts of kerosene. The spraying is carried out once or twice each week but a recent modification has been the spraying of the outside of the house under the eaves before entering to spray the interior. This is effective and the authors give figures of spleen and parasite rates which show how valuable the whole procedure is. The cost is less than that of anti larval work but is high in relation to the economic level of the community.

DZHANGIROV (p 179) has used a cold water infusion of tobacco dust which contains 0.1 per cent nicotine as a spray for killing mosquitoes in cellars in the Caucasus region. He claims that 100 per cent of the mosquitoes can be killed if soft soap is added to the strained infusion immediately before use. POGODINA and SOKOLOV (p 510) write of the use of anabesine [an isomer of nicotine] as an aerosol for the destruction of anophelines. The minimum concentration which killed all the mosquitoes in a room in 8 minutes was 0.2 oz per 1 000 cu. ft. a rate considerably smaller than that required for HCN. The aerosol has an unpleasant smell and causes coughing so that the operator must be protected. Details of use must be sought in the original abstract.

CHOPRA *et al* (p 234) found that powdered leaves of *Tephrosia vogelii* from Assam have no larvicidal or insecticidal action and that the action of a kerosene extract is due to the vehicle only. It had previously been reported that in Rhodesia the leaves had been found useful in these respects.

CHOPRA *et al* (p 645) state that the essential oil of *Artemisia vulgaris* which grows abundantly in hilly districts of India, has insecticidal and larvicidal properties comparable with those of kerosene.

Water control—RAMSAY and ANDERSON (p 232) record their experiences with siphons in N Bengal, for the control of *A. minimus*. Since a prolonged flush controls a greater length of channel than more frequent shorter flushes, large reservoirs are required—a total discharge of 50 000 gallons is the minimum amount necessary to control a mile of a channel 6 to 8 feet wide. The Dooars siphon was satisfactory and its construction is not difficult. WORTH and SUBRAHMANYAM (p 232) discuss the siphons used in Ceylon. With a head of 25 to 40 inches of water it should be possible to control a distance of 5 000 feet below the dam. Hand-operated gates may be preferable to automatic siphons where dry weather flow is low.

Intermittent irrigation of rice fields in Portugal is carried out according to the cycle 10 days wet, 7 days dry. HILL and CAMBOURNAC (p 564) state that in this way the number of mosquito larvae has been reduced by over 80 per cent, the amount of water needed for irrigation decreased, and usually the yield of rice increased without detriment to the quality of the grain. Special preparation of the fields is needed but this is the only feasible measure of control so far evolved. RUSSELL and RAO (p 559) state that intermittent irrigation of rice fields in S.E. Madras 2 dry days and 5 wet, will prevent the breeding

of mosquitoes except during periods of daily rain. The planting of rice in irrigation channels themselves might control the breeding of *A. culicifacies* after the rice has attained a height of 12 inches above the water surface and may do this without serious obstruction to the flow of water.

MONDAL (p. 564) gives an example of stream training for the control of *A. flavistilis* and *A. varuna* in the Jeypore hills.

HOPKINS (p. 233) writes of afforestation as a useful procedure in the drying-up of swamps in Uganda, in which *A. gambes* and *A. funestus* breed diffusely though not with great intensity. Swamps should first be drained and then afforestation with species of *Eucalyptus* may be carried out, with care that the spacing of the trees should be such as to produce the maximum leaf area. Ditches should be heavily shaded, and indigenous species of *Ficus* are useful for this. Residual pools should be filled in.

Oiling.—WATSON (p. 509) states that all the toxic substances in anti-larval oils are soluble in water and are capable of penetrating larval cuticle. The larval heart is very susceptible to these water-soluble toxins. He discusses the mechanism of the entry of oil into the spiracles.

CROOK *et al.* (p. 565) show that although the larvicidal action of pyrethrum powder in the field is slight, the action of kerosene is enhanced, and its spreading power increased, by the addition of pyrethrum. Aqueous extract of pyrethrum has insecticidal properties although the active pyrethrins are insoluble in water and the insecticidal action cannot always be correlated with the pyrethrin content.

Paris green.—STAROSTIN (p. 509) in Russia has found that to be effective as a vehicle for the dilution of Paris green, road dust should flow easily. This capacity is found in those dusts which do not form lumps, are not easily reduced in volume when submitted to pressure and are not hygroscopic. Sandy dusts with little clay are good, but much depends on the size of the sand particles. Sand from rivers or deserts is suitable since the particles are polished and oval, whereas the grains from foothills or mountains are angular and more apt to form a compact mass.

Although aeroplane dusting of Paris green is impracticable in low-lying, densely populated areas near large rivers of the Smolensk region, where breeding places are small and scattered, LARUX (p. 510) states that it is the most effective method of treating large turf pits in peat bogs, which are usually inaccessible for hand dusting. An additional measure of control consists of the spraying of dwellings with an emulsion of kerosene soft soap and water. In the Tennessee valley where the river has been impounded and transformed into a series of large reservoirs, BISHOP (p. 292) reports that Paris green applied by aeroplane at the rate of about one pound per acre has produced no catastrophic destruction of aquatic organisms important as fish food. Arsenic accumulates in the fish but not to an extent which renders them unfit for human consumption. Larvicidal oil and pyrethrum larvicide destroy a large proportion of amphipods.

RUSSELL *et al.* (p. 564) describe the procedure for the use of Paris green in suspension, with kerosene, egg albumin and water which is sprayed on to the surface of water. By this means mosquito breeding may be effectively controlled even in the presence of considerable vegetation.

In a comparison of the larvicidal actions of a pyrethrum emulsion and a Paris green mixture HENDERSON and HOWARD (p 292) show that the former is much more expensive than the latter to produce the same effect and that it kills many invertebrate mosquito predators.

Fish—VANDERPLANK (p 563) describes certain small fish, closely allied to *Gambusia*, which are indigenous to East Africa and which should be of greater local value than *Gambusia* in malaria control. JOHN (p 233) notes that the Indian top minnow *Aplocheilichthys lineatus* common in Travancore is a very useful larvivorous fish.

Malaria of Monkeys and Birds

Monkeys—It has often been stated that malaria runs a more severe course in people who are ill nourished and in poor health than in those who are well fed and healthy. To test this view PASSMORE and SOMMERVILLE (p 646) fed two groups of monkeys (*Macacus radiatus*) one group on a poor diet resembling that of poor human rice eaters and the other on a generous and healthy diet. Great differences in general health were noticed but it was found that injection of equal doses of *P. knowlesi* or *P. cynomolgi* into the members of the two groups produced little if any difference in reaction between the groups. The course and severity of the primary attacks were not affected by the state of nutrition.

MULLIGAN *et al* (p 648) have carried out experiments on monkeys which lead them to conclude that there are three agencies at work in the defence of the organism against malaria: first, an inherent quality of the host which is inimical to the development of the parasite; second, a cellular mechanism in the lymphoid-macrophage system centred chiefly in the spleen; third, a specific humoral factor acquired as the result of infection. High natural immunity is not greatly affected by removal of the spleen and depends therefore on inherent unsuitability of the body tissue. Poor natural immunity is almost abolished by splenectomy and therefore depends upon the lymphoid-macrophage system. Details of the experiments with different species of monkeys and parasites are given. The same authors (p 647) show that injection of homologous immune serum will slightly modify *P. knowlesi* infection in monkeys (except those from which the spleen has been removed) but not infection with *P. cynomolgi*. In monkeys previously infected with *P. cynomolgi* and in which, therefore, the lymphoid-macrophage system has been stimulated, anti-*P. knowlesi* serum will definitely control *P. knowlesi* infection. Yet monkeys recovered from *P. cynomolgi* infection are as susceptible as normal controls to *P. knowlesi*. The conclusion is that defence mechanism involves the interaction of both cellular and humoral agencies. The same authors (p 648) have obtained similar results by using saline extracts of malarial spleens in place of immune serum: this indicates that the immune substances are present in the spleen though not, apparently, in greater concentration than in the blood.

TALIAFERRO and KLÜVER (p. 412) have studied *P. brasilianum* infections of monkeys: they consider that the lymphoid hyperplasia in malaria augments the mesenchymal reserve from which monocytes and newly formed macrophages arise.

COGGESHALL (p 293) has shown experimentally that definite immune bodies capable of preventing infection when incubated with parasites

of mosquitoes except during periods of daily rain. The planting of rice in irrigation channels themselves might control the breeding of *A. culicifacies* after the rice has attained a height of 12 inches above the water surface, and may do this without serious obstruction to the flow of water.

MOXDAL (p. 564) gives an example of stream training for the control of *A. flavianilis* and *A. nersa* in the Jeypore hills.

HOPKINS (p. 233) writes of afforestation as a useful procedure in the drying-up of swamps in Uganda, in which *A. gambiae* and *A. funestus* breed diffusely though not with great intensity. Swamps should first be drained and then afforestation with species of *Eucalyptus* may be carried out with care that the spacing of the trees should be such as to produce the maximum leaf area. Ditches should be heavily shaded, and indigenous species of *Ficus* are useful for this. Residual pools should be filled in.

Oiling.—WATSON (p. 509) states that all the toxic substances in anti-larval oils are soluble in water and are capable of penetrating larval cuticle—the larval heart is very susceptible to these water soluble toxins. He discusses the mechanism of the entry of oil into the spiracles.

GEORRA *et al.* (p. 565) show that although the larvicidal action of pyrethrum powder in the field is slight, the action of kerosene is enhanced, and its spreading power increased, by the addition of pyrethrum. Aqueous extract of pyrethrum has insecticidal properties although the active pyrethrins are insoluble in water and the insecticidal action cannot always be correlated with the pyrethrin content.

Paris green.—STAROSTIK (p. 509) in Russia has found that to be effective as a vehicle for the dilution of Paris green, road dust should flow easily. This capacity is found in those dusts which do not form lumps, are not easily reduced in volume when submitted to pressure, and are not hygroscopic. Sandy dusts, with little clay are good, but much depends on the size of the sand particles. Sand from rivers or deserts is suitable since the particles are polished and oval, whereas the grains from foothills or mountains are angular and more apt to form a compact mass.

Although aeroplane dusting of Paris green is impracticable in low-lying, densely populated areas near large rivers of the Smolensk region, where breeding places are small and scattered, LAZUK (p. 510) states that it is the most effective method of treating large turf pits in peat bogs, which are usually inaccessible for hand dusting. An additional measure of control consists of the spraying of dwellings with an emulsion of kerosene soft soap and water. In the Tennessee valley where the river has been impounded and transformed into a series of large reservoirs, BISHOP (p. 292) reports that Paris green applied by aeroplane at the rate of about one pound per acre has produced no catastrophic destruction of aquatic organisms important as fish food. Arsenic accumulates in the fish but not to an extent which renders them unfit for human consumption. Larvicidal oil and pyrethrum larvicide destroy a large proportion of amphipods.

RUSSELL *et al.* (p. 564) describe the procedure for the use of Paris green in suspension, with kerosene, egg albumin and water which is sprayed on to the surface of water. By this means mosquito breeding may be effectively controlled even in the presence of considerable vegetation.

In a comparison of the larvicidal actions of a pyrethrum emulsion and a Paris green mixture HENDERSON and HOWARD (p 292) show that the former is much more expensive than the latter to produce the same effect and that it kills many invertebrate mosquito predators.

Fish—VANDERPLANK (p 565) describes certain small fish, closely allied to *Gambusia*, which are indigenous to East Africa and which should be of greater local value than *Gambusia* in malaria control. JOHN (p 233) notes that the Indian top minnow *Aplocheilichthys lineatus* common in Travancore is a very useful larvivorous fish.

Malaria of Monkeys and Birds

Monkeys—It has often been stated that malaria runs a more severe course in people who are ill-nourished and in poor health than in those who are well fed and healthy. To test this view PASSMORE and SOMMERVILLE (p 646) fed two groups of monkeys (*Macacus radiatus*) one group on a poor diet resembling that of poor human rice eaters and the other on a generous and healthy diet. Great differences in general health were noticed but it was found that injection of equal doses of *P. knowlesi* or *P. cynomolgi* into the members of the two groups produced little if any difference in reaction between the groups. The course and severity of the primary attacks were not affected by the state of nutrition.

MULLIGAN *et al* (p 648) have carried out experiments on monkeys which lead them to conclude that there are three agencies at work in the defence of the organism against malaria: first, an inherent quality of the host which is inimical to the development of the parasite; second, a cellular mechanism in the lymphoid-macrophage system centred chiefly in the spleen; third a specific humoral factor acquired as the result of infection. High natural immunity is not greatly affected by removal of the spleen and depends, therefore on inherent unsuitability of the body tissue. Poor natural immunity is almost abolished by splenectomy and therefore depends upon the lymphoid-macrophage system. Details of the experiments with different species of monkeys and parasites are given. The same authors (p 647) show that injection of homologous immune serum will slightly modify *P. knowlesi* infection in monkeys (except those from which the spleen has been removed) but not infection with *P. cynomolgi*. In monkeys previously infected with *P. cynomolgi* and in which, therefore the lymphoid-macrophage system has been stimulated, anti-*knowlesi* serum will definitely control *P. knowlesi* infection. Yet monkeys recovered from *P. cynomolgi* infection are as susceptible as normal controls to *P. knowlesi*. The conclusion is that defence mechanism involves the interaction of both cellular and humoral agencies. The same authors (p 648) have obtained similar results by using saline extracts of malarial spleens in place of immune serum: this indicates that the immune substances are present in the spleen though not, apparently in greater concentration than in the blood.

TALIAFERRO and KLÜVER (p 412) have studied *P. brasilianum* infections of monkeys: they consider that the lymphoid hyperplasia in malaria augments the mesenchymal reserve from which monocytes and newly formed macrophages arise.

COGGESHALL (p 293) has shown experimentally that definite immune bodies capable of preventing infection when incubated with parasites

before injection into monkeys occur in the serum of human beings who have recovered spontaneously from infections with *P. knowlesi*. Complement fixing bodies are also present, but there is no uniform correlation between their titre and the protective action of the sera.

SHORTT and MEXON (p. 338) failed to produce any active immunity by the injection into monkeys of killed *P. knowlesi* freed from their host red cells.

SINGH and SINGH (p. 294) observed that when a suspension of washed red cells from *Macacus rhesus* infected with *P. knowlesi* was used, the serum from monkeys infected with the same parasite produced agglutination of the cells. Sera from animals infected with *P. cynomolgi* or *P. swui* would not agglutinate cells from animals infected with *P. knowlesi*. They (p. 294) have found that infection of *Macacus rhesus* with *P. knowlesi*, *P. cynomolgi* or *P. swui* and recovery protects against reinfection with the same parasite, but that cross immunity is not produced. The same authors (p. 294) have obtained some success in the treatment of *Macacus rhesus* infected with *P. knowlesi* by the injection of large quantities of serum from chronically infected animals.

SHORTT and MEXON (p. 338) have succeeded in infecting monkeys with *P. knowlesi* and fowls with *P. gallinaceum* by the oral route care having been taken not to injure the mouth during the administration.

DIXSHIT and GANAPATHI (p. 647) have used sulphathiazole successfully in *P. knowlesi* infection of monkeys.

Birds—MULLIGAN and RUSSELL (p. 338) report that sporozoites of *P. gallinaceum* are agglutinated by normal sera of animals and man, more readily by sera of animals which have suffered from malaria, and most readily by sera of fowls chronically infected with the homologous parasite. These results are amplified in a later paper by MULLIGAN *et al.* (p. 646) who reach the conclusion that sporozoite agglutination in high dilutions (1/64 or more) of malarial serum is a specific reaction. Human malaria serum agglutinates sporozoites of *P. gallinaceum*. Details of technique are given.

SCHULEMANX (p. 35) has given a résumé of modern views on the development of exoerythrocytic schizonts in the malaria of birds.

PORTER and HUFF (p. 513) state that erythrocytic schizogony has been observed in strains of *P. relictum*, *P. gallinaceum*, *P. cathemerium*, *P. circumflexum* and *P. nucleophilum* but not in other species of bird malaria parasite. Bodies resembling these schizonts have been seen in monkey and human malaria (*P. vivax* and *P. falciparum*). The authors from a review of the literature conclude that although direct development from sporozoites occur, the schizonts may arise from erythrocytic forms. MAXWELL (p. 513) notes that exoerythrocytic schizogony is found in infections with *P. relictum* var. *maulisiense* and that this form of parasite has been found in a canary infected by means of a single erythrocytic parasite: a conclusive proof that the exoerythrocytic form may arise from the usual blood form.

SHORTT *et al.* (p. 413) have inoculated very young chicks, or chicks still within the egg, with sporozoites of *P. gallinaceum*. Their observations lead them to think that sporozoites enter the blood and are taken up by or actively enter the endothelial cells. They multiply by schizogony and increase in numbers until merozoites enter red cells to become pigmented forms. Exoerythrocytic schizogony continues as a low grade infection not visually detectable until it is stimulated to further development and causes a relapse of the pigmented forms.

It is usually assumed that malaria persists as a low grade infection with pigmented forms but the authors put forward the view that it may be merozoites from exoerythrocytic schizonts which are responsible for cases of malaria infection in which gametocytes are the only blood forms present.

SCHULEMANN and SPIES (p 294) quote evidence from experimental work which proves that pigment free exoerythrocytic schizonts which arise directly from sporozoites in birds are contained in histiocytes.

Further development takes place either intra or extra-cellularly intra-cellular development may be within the histiocytes when pigment free forms are found or in the red cells when pigmented forms are produced.

COULSTON and MANWELL (p 512) have produced infection with *P. circumflexum* in a single red cell isolated by micro-manipulation or dilution methods. From such infections exoerythrocytic schizonts have developed though not in the first birds infected, and it is therefore evident that pigmented forms existing in red cells can give rise to non pigmented forms, but these are probably only found when the defensive mechanism of the host is severely taxed, as it is by a massive dose of parasites.

HEWITT (p 295) remarks that if exoerythrocytic schizogony is part of the life-cycle of some avian malarial parasites the factors which govern its appearance are unstable such schizonts have never been found in one strain of *P. cathemerium* even after exhaustive search though they occur readily enough with other strains of the same parasite.

In canaries infected with *P. cathemerium* HEGNER (p 296) shows that the observed daily increase in the number of parasites is well below that which would be expected on the basis of the average number of merozoites produced at schizogony. An increasing percentage of parasites is destroyed each day which indicates that immunity is acquired gradually and does not appear suddenly at the crisis. Human and monkey malaria appears to be similar to that of birds in this respect. GINGRICH (p 650) points out that in *P. cathemerium* infection two-thirds of the merozoites fail to survive. From experiments on the blocking of the reticulo-endothelial system in this infection he reaches the conclusion that natural immunity as evidenced by the failure of numbers of parasites to develop during the acute rise in the infection is due to some factor other than phagocytosis. On the other hand the acquired immunity leading to the crisis and recovery is due to active phagocytosis, as this can be interfered with by blockage of the phagocytic cells. He (p 650) has produced a high degree of immunity in birds by the intravenous injection of vaccines of *P. cathemerium* prepared either by subjecting infected red cells to the action of 1 per cent. formalin or to a temperature of 50°C for ten minutes. The immunity is not however as great as that which follows natural infection and depends on the quantity of vaccine administered. A vaccine of normal uninfected blood hastens recovery after the crisis an effect probably due to activation of the lymphoid-macrophage system leading to more intensive phagocytosis than normal.

LUMSDEN and BERTRAM (p 414) record the results of a study of the biology of *P. gallinaceum*. JACOBI (p 566) writes of the biology of *P. gallinaceum* there is no clear-cut cycle of development. Chronically infected birds show marked immunity to superinfection but birds

clinically recovered may harbour parasites for at least 1½ years. BELTRAN and LARINAS (p. 567) however state that the schizogony cycle of *P. gallinaceum* occupies 36 to 42 hours and that there is a high degree of synchronicity with considerable variations from bird to bird.

TERZIAN (p. 567) gives a description of the biological characteristics of *P. lophurae*.

Working with *P. lophurae* in young chicks TALLAFERRO and TALLAFERRO (p. 714) have shown clearly that acquired immunity can be passively transferred provided that sufficient doses of immune serum are used and continued over a sufficient period.

DAS GUPTA and SIDDONS (p. 715) describe *P. praecox* var. *numai* a parasite of the numa. It is similar to the classical form of *P. praecox* but differs in not being infective for the Indian house sparrow and only slightly for the canary.

LUMSDEN and BERTRAM (p. 414) have investigated the action of plasmoquine and of praquine on gametocytes of *P. gallinaceum*, giving information on the doses required to prevent infection of mosquitoes. There appears to be no difference in action between the two drugs. MAXWELL *et al.* (p. 651) report that sulphapyridine is effective against *P. circumflexum* but not against *P. relictum* var. *maximow* and *P. nucleophilum*. AFRICA *et al.* (p. 415) have obtained success in the treatment of *P. relictum* infections of birds with prontosil.

Charles Wilcocks

LEPROSY

ORISSA. ANNUAL PUBLIC HEALTH REPORT FOR YEAR 1939 AND ANNUAL VACCINATION REPORT FOR YEAR 1939-40 [VERGHESSE (G.) Director] pp. 38-43.—The Annual Report of the Executive Committee of the Provincial Council of the British Empire Leprosy Relief Association (Indian Council) Orissa Branch for the Year 1939-40.

This report deals with extensive treatment of leprosy cases at the dispensaries and hospitals of the province at a small cost, due to the cordial cooperation of the medical men in charge of these institutions, following on well organized surveys and propaganda by the local Leprosy Association. During 1939-40 9,625 cases were under treatment as out-patients doubtless mostly early cases, for 93 per cent. showed some definite improvement after a year's treatment. In addition Village Leprosy Relief Committees have been successful in obtaining voluntary isolation of a number of infective cases in villages or in their own homes as advocated by MUTR. The examination of a population of 822,629 persons in 2,271 villages resulted in the detection of 5,669 cases and 129 more were detected among 14,000 school-children. The number of infectious cases now isolated is 782, an increase of 247 over the previous year. The year's expenditure amounted to \$1,544 only among a population of over 7,000,000. L. Rogers

GUPITO (Ricardo S.) & RODRIGUEZ (Jose N.). A Field Study of Leprosy in Talisay Cebu, Philippines.—*Internal J. Leprosy* Manila, 1941. Apr.-June. Vol. 9. No. 2. pp. 149-166. With 2 figs. & 1 plate.

This is a detailed study of the distribution and incidence of leprosy in the municipality of Talisay in the Cebu Province of the Philippine Islands.

The area includes a coastal a riverine and a mountain area in which a house to-house census and a sanitary and sociological survey were made. The area is economically better off than the previously surveyed Cordova district. About two-thirds of the estimated population was surveyed including 10 672 persons 99.3 per cent of whom were seen. Talisay is one of the most highly infected municipalities of Cebu from which 403 leprosy cases had been reported since 1903. The registered living lepers numbered 149 of whom 84 were segregated and 65 more were discovered, bringing the total incidence up to 19.5 per mille inhabitants. Only 11 of the 65 new cases were bacteriologically positive and should have been segregated. Of the total cases in the municipality 36 per cent were in the quiescent or arrested state including those paroled. The lowland area showed a rate of 22.5 per mille the mountain 18.8 and the coastal area 19.5. Wide variations were found in subdistricts and it appeared that low incidence was due to few cases having been introduced into them. The highest incidence was in the 30-39 age group but inquiries into the age of onset revealed the highest incidence of 29.8 per cent in the 10-14 year old group and 64.9 per cent from 0-19 18.3 per cent from 10-29 and only 16.8 per cent in later decades. In the Cordova survey 85 per cent were in the 0-19 group and 35 per cent gave a history of house contact with a previous case. In Talisay that figure was 37 per cent but of 2 072 families only 187 were leper families in which one or more fresh cases had developed. There was the same tendency as had been noted in Cordova for most cases to occur where there was overcrowding. A study of water supply and excreta disposal showed no significant differences between leper and non leper households. Talisay has high hookworm but low yaws incidence. L. R.

GUINTO (Ricardo S.) & RODRIGUEZ (José N.) A Leprosy Survey of a Control Area—Santander, Cebu, Philippines. With a Very Low Prevalence of Leprosy—*Internal Jl Leprosy* Manila. 1941 July-Sept Vol. 9 No 3 pp 315-325 With 1 fig

This area of Cebu was selected as having a low leprosy rate. Of a total population of 6 673 as many as 98.6 per cent were examined but only two bacteriologically negative cases of leprosy were found in addition to two previously known cases one of which had been fatal. This gives a rate of 0.45 per mille against 17.6 in Cordova and 19.7 in Talisay found in the previous surveys. Spread had occurred only within the originally infected household. Except for being a more isolated area it is difficult to account for the low leprosy rate in Santander but overcrowding was less than in the other areas.

L. R.

RAI (Schowa) Leprosy in Canton. A Survey—*Taiwan Igakka Zasshi* (*Jl Med Assoc Formosa*) 1941 June Vol. 40 No 6 [In Japanese pp 1133-1162 With 5 figs & 1 chart [19 refs.] English summary pp 1162-1163]

In the whole of China it has hitherto been thought that there were about one million lepers with particularly heavy incidence in the Province of Canton. The author has examined 52 000 persons in the city of Canton these belonged to four groups—the Tamans living entirely in boats the passengers in boats on the river people

found in the streets and villagers. Of these, leprosy was found in 84 representing an incidence of 1.8 per 1 000 a rate lower than has been estimated by others. It is pointed out that eczema and scabies are common in Canton especially in the boat dwellers and may be mistaken for leprosy. The neural type of disease is more common than the nodular.

C IV

ROSSAS (Thomas Pompeu) Leprosy in the State of Maranhão, Brazil. —*Internat J Leprosy* Mamm. 1941 Apr-June Vol. 9 No. 2 pp. 167-178. With 5 figs. on 1 plate

This is a study of the incidence of leprosy in the Maranhão Province in the north-east of Brazil. The climate is hot and humid in the first six months of the year and dry in the second half. It is mostly low-lying and well watered with a heavy rainfall. The population is very mixed, with much Negro blood, and mostly rural with very bad housing conditions and undernourishment. The disease first appeared in the coast town of St. Louis and spread inland. It has been known to be widely prevalent since 1828. In 1890 the number of cases was estimated at 300 but in 1922-23 1,023 were recorded, 685 of which are analysed. Males, as usual, were about twice as numerous as females, and the largest number fell in the age period of 20-29 years. A recent census in 1939-40 revealed 1,000 cases or 1.8 per mille: nearly three-fourths of these were reported by travelling doctors. Closed cases formed 61 per cent and children only 6.1 per cent. All races are equally affected.

In the earlier period two leper asylums and three leper villages were established, but since 1920 modern methods of control have been adopted. A leprosanarium-colony has been founded which now provides for 160 patients, but is being enlarged to accommodate 500: the organization is described. Chaulmoogra derivatives are mainly used in treatment. The author advises the appointment of three travelling physicians to re-examine domiciled patients and their contacts and to verify new cases, together with the establishment of treatment posts under male nurses in the principal foci of the disease to be visited by the physicians, as an economical plan to control the disease in a relatively short period of time.

L. R.

REVIERGO (Antonio J) Contribución al estudio de la lepra en Entre Ríos. [Leprosy in Entre Ríos.]—*Semana Méd.* 1941 July 24 Vol. 48 No. 30 pp. 231-235 With 2 figs

According to PUENTE in 1938 Entre Ríos came sixth among the Argentine provinces as regards prevalence of leprosy. Misiones had 2,433 Formosa 1,509 Corrientes 0-691 Santa Fé 0-639 Chaco 0-489 and Entre Ríos 0-353 per thousand inhabitants. By 1940 there were, in the last-named, 364 among a population of 812,645 or 0.423 per mille. Of seventy patients studied, 21 were between 20 and 30 years of age, and 13 between 50 and 60 years. Of these seventy the author states "in 60 per cent the course was severe and the condition infective hygienically the conditions of 78.6 per cent. were bad, medical aid was inadequate in 68 per cent., the economic status of 84.2 per cent. was bad, and the subjects lived together in close contact—a ready soil for propagation of the *Mycobacterium leprae*."

H H S

PESCE (Hugo) Apuntes para la geografia de la lepra en la Sierra del Perú. [Distribution of Leprosy in Peru].—*Actualidad Med Peruana* Lima. 1941 May Vol. 7 No 1 pp. 8-12. [17 refs.]

COT LESMES (Vicente) La lepra en Santiago de Cuba. (Reporte de 105 casos.) [Leprosy in Santiago de Cuba].—*Rev Méd-Quirúrg de Oriente* Santiago de Cuba. 1941 Sept Vol. 2. No. 3 pp 168-171

In the 9 months, May 1939-January 1940 the author reported on 30 cases of leprosy which he had seen and he stated that since several of these presented open and infectious lesions the incidence was likely to go up. Between February 1940 and May 1941 he has seen another 75 cases and he now comments on the total 105. Forty two were of the nodular type, 50 of the neural and 13 mixed, or 40.47-6 and 12.4 per cent. respectively. Sixty-one were females, 44 were males. As regards age, none was under 5 years. 7 (6.6 per cent.) were between 5 and 10 years. 16 (15.2) between 10 and 15 years. 14 (13.3) between 15 and 20 years, 33 (31.4) between 20 and 30 years and in succeeding decades 13 (12.4), 9 (8.6), 8 (7.6) and over 60 years 5 (4.8). He estimates that there are 2,000 to 4,000 lepers in Cuba [a wide margin]. It is far from uncommon to find more than one affected in a family and the disease would seem to cause little fear since lepers were found in such occupations as hairdressers, cooks, a restaurant chef, butler, servant, maids, dressmakers, laundresses, tobacconist, tramway conductor, students, etc. H H S

DOULL (James A.) RIVERA (E. Martinez) SAUNDERS (George M.) GUINTO (Ricardo S.) & MORALES (E. Garrido) A Note on Leprosy in Puerto Rico.—*Bol Asoc Med. de Puerto Rico* 1941 June. Vol 33 No 6 pp 217-223

This note deals with the history and present incidence of leprosy in Porto Rico. The disease is believed to have been introduced in the early days of the slave trade and was looked on with indifference until about 1870 a few cases were hospitalized. Since 1912 the recorded deaths from leprosy averaged 4.5 annually. In 1940 the known cases numbered 102 but at least as many more are believed to exist. The examination of 1,873 schoolchildren revealed no cases so the problem does not appear to be a serious one. L R

AYCOCK (W. Lloyd) & HAWKINS (James W.) Regional, Racial, and Familial Relationships in Leprosy in the United States.—*Public Health Rep* 1941 June 27 Vol. 56. No 26. pp 1324-1336. With 4 figs.

The data in this paper are based on information concerning 927 admissions to the Carville settlement. Foreign-born leprosy patients numbered 430 introduced by immigration from fourteen countries. The American born numbered 497 of whom 370 belonged to southern States of California, Texas, Louisiana and Florida. Out of 396 stationary patients only 4 failed to give history of contact with a local or foreign focus of leprosy and 491 of 497 native-born persons can be allocated to known areas of prevalence of the disease. In Texas there is a concentration of cases of German stock. L R

HANSEN (John H.) Behavior of Leprosy Bacilli in Complex Liquid Media with Highly Available Sources of Nutrient and Accessory Substances.—*Internat. J. Leprosy* Manila. 1941 July-Sept. Vol. 9 No. 3. pp 275-298. [28 refs.]

This is an account of a further painstaking attempt to cultivate the bacillus of Hansen. The author assumes that some of the bacilli in lepromatous lesions are living and consequently it is necessary to study a variety of physiological conditions which might make it possible to cultivate the bacilli from each lesion. The media were prepared on the principle that highly pathogenic bacilli are deficient in the power to synthesize enzymes and other materials required for the production of new cells. Blood and serum were used, supplemented by a variety of combinations of digestion or extraction products of blood, egg yolk, tissues, acid fast bacilli and yeast, also with peptones. Long's synthetic medium, and other simple sources of nitrogen and carbon. Further tissue extracts, sterile egg-yolk suspensions, and chick embryo juice were used as basic solutions supplemented in similar ways. Liquid media were used, with blood and Long's medium as the basis, as liquid media permitted estimates to be made of the number of bacilli present from time to time to provide badly needed quantitative methods to allow the fate of the inoculated bacilli to be followed. Finely ground suspensions of subcutaneous lepromatous nodules were used for inoculating media. The original paper should be consulted regarding the technique, which is fully described. Fifteen nodules were used after the rejection of two. A number of the tubes were incubated under partial pressures of CO_2 .

Diphtheroid bacilli were most frequently grown, but three of the six cases furnishing them showed ulcers of the skin, so they are considered to be contaminations. In addition one of the ulcerated cases yielded cultures of one streptothrix and two acid-fast bacilli only in single inoculated tubes the latter being dissimilar these also are not regarded as the causative organisms of leprosy. One non-ulcerated case also yielded an acid-fast bacillus which is not considered to be different from those obtained by earthen workers, nor were they tubercle bacilli. Moreover quantitative microscopical examinations of the liquid media at intervals revealed no evidence of multiplication of the inoculated leprosy bacilli in any of the 109 nutritional combinations tested. Nor did growth take place in media shown to be suitable for the cultivation of human blood monocytes or of the fibroblast of the lepromata. This well-planned attempt to cultivate the leprosy bacillus on scientific lines has therefore, so far yielded negative results. L. R.

DHARMENDRA. Complement-Fixation by Leprous Sera after Absorption by Various Acid-Fast Bacilli.—*Indian J. Med. Res.* 1941 July Vol. 29 No. 3. pp. 523-525.

This note deals with the complement-fixing power of leprosy sera before and after absorption with different acid-fast bacilli. Absorption of the sera was carried out by mixing them with thick bacillary suspensions, allowing the mixture to stand overnight, and then filtering through a candle. The bacilli of Lleras Duval, Bason, Myro *plis* and one from a leprosy nodule were used. An unabsorbed portion of the serum and portions absorbed by each of the five bacilli were tested for their complement-fixing power in the presence of all of six antigens

[four from leprous material one from *Mycobacterium tuberculosis* one from *Mycobacterium phlei*] in dilutions of from 1-5 up to 1-200 sera from twelve lepromatous cases being used. In dilutions of 1-25 and upwards the complement fixing power of the absorbed sera was less than that of the unabsorbed, all the bacillary emulsions acting in a similar manner. Control staphylococcus cultures gave variable results. The author concludes that the experiments afford no proof of the specificity of any of the bacilli and that such complement fixation tests are unlikely to furnish any evidence for or against the genuineness of such acid-fast cultures. L. R.

DE SOUZA ARAUJO (H. C.) Pathogenicity of Acid-Fast Bacilli Isolated from Human Leprosy by Mlgone.—*Internat J'l Leprosy* Manila. 1941 Apr-June. Vol 9 No 2. pp 209-214 With 7 figs. on 2 plates

The author reports animal inoculations with two new strains of acid fast bacilli isolated from skin lesions of human leprosy by MIGONE in Paraguay. The injection of these cultures into rats and mice produced typical granulomata similar to those obtained with emulsions of human leprous nodules. They affected the skin and muscles and so differed from infections with Stéfansky's rat leprosy bacillus. The granulomata were rich in globies (clusters) of acid fast bacilli which are seldom obtained in experiments with cultures. L. R.

CHAUSSINAND (R.) Contributions à l'étude de la lèpre. II. Inoculation du bacille de Hansen au singe. [Inoculation of Human Leprosy Bacilli into the Monkey]—*Internat J'l Leprosy* Manila. 1941 Apr-June Vol 9 No 2. pp. 203-208. With 1 plate.

These experiments were carried out on *Macacus cynomolgus* with an emulsion rich in lepra bacilli and by various routes. Nodules of various sizes resulted in from three to five weeks and they were reabsorbed without leaving any trace at the end of about one and a half months. The reappearance of the vanished first nodules may occur after a fresh inoculation of lepra bacilli in another part of the body but after several inoculations they re-form and disappear again more rapidly than before the nodules do not reappear after a fourth reinoculation. Immunization is thus gradually brought about. These monkeys are therefore not absolutely refractory to human leprosy. L. R.

FITE (G. L.) Development of a Leprous Process in Rats at the Site of Inoculation with Material from Human Leprosy.—*Public Health Rep* 1941 Sept. 26 Vol. 56 No 39 pp. 1919-1922.

The author records that 6 out of 154 rats inoculated with emulsions of human leprosy nodules developed, after an incubation period of about 18 months nodules at the site of the inoculation resembling those of rat leprosy but in which the bacilli tended steadily to decrease. Mucin suspensions of the inoculated material gave a much larger proportion of positive results with more numerous bacilli. L. R.

NOZASCO (J. O.) & LARA (C. B.) Histological Study of an Early Case of Leprosy in a Young Child of Leprous Parents. Report of a Case, with Autopsy.—*Internat. Jl. Leprosy* Manila, 1941 Apr-June Vol. 9 No. 2 pp. 181-192. With 1 fig & 2 plates. [18 refs.]

This is a full report on the histological findings in an early infection in a child who died from pneumococcal empyema when 17 months old. Two months previously a wral-like lesion, containing numerous lepra bacilli, had been detected on the right knee which was regarded as a primary lesion, but two days before death only a slightly depressed non-indurated scar remained. This was found histologically to be a very young leproma with numerous bacilli and some foamy cells. Lepra bacilli were also found in considerable numbers in the corresponding lymphatic nodes of the part, but not elsewhere in the lymph nodes, nerves or other organs. This indicates spread from the primary lesion through the lymphatic channels. Two plates illustrate the histology of the lesions. L. R.

CAMPOS (Nelson Souza) & RIBEIRO (Eurico Branco) Neurite e caseose de nervo na lepra tuberculóide. (Neuritis and Caseation of Nerves in Tuberculoid Leprosy).—*Ann. Paulista Med. e Cirurg.* 1941 June. Vol. 41 No. 6 pp. 527-529

A child of five years of age was apparently healthy till the age of four years. She then developed a small reddish nodule, the size of a pea's head with a pale surround in the right temporal region. This disappeared with treatment, leaving a scar. A few months later a thickening of the ulnar nerve of the right arm was noticed, but caused no pain. Mitruda reaction was $-++$ but no bacilli were found and there was wasting of the muscles of the hand. Some 18 months or so after this, operation was undertaken and creamy pus was found coming from the nerve.

The author states that caseation, which is the last stage in the tuberculoid process, starts always in the centre of the nerve extends axially destroying the central fibres, forming necrotic foci at short intervals, then passing, herma-like through the epineurium, forming small swellings along these nerves of small calibre and pedunculated swellings in the trunks of the larger nerves. According to their intensity they remain deep or open to the exterior. In the latter case cicatrization occurs with adhesion of the skin to the nerve below and the formation of a characteristic retractile scar. H. H. S.

STEIN (A. A.) & WYCHENIEWSKY (A. A.) Ein Fall von Lepra mit kaseösen Veränderungen in den Nerven. [Leprosy with Caseous Changes in the Nerves].—*Internat. Jl. Leprosy* Manila, 1941 July-Sept. Vol. 9 No. 3 pp. 305-308. With 4 figs. on 1 plate.

This is a report on the microscopical changes in two nodules removed from a nerve in a case of anaesthetic leprosy. The patient showed thickening and nodulation of the left ulnar and to a less extent of the median nerve accompanied by anaesthesia and partial claw hand, but no skin lesions. Microscopical examinations were made of two nodules the size of a pea with the following results. In the centre necrosis was found, around which were seen epithelioid and giant cells, surrounded

by a ring of lymphocytes. Around the whole was a fibrous layer the only vascular part of the nodule. The whole was diagnosed as neuro-fibromatous. The lesions were therefore tuberculoid in nature. L. R.

FITE (G. L.) *The Vascular Lesions of Leprosy*—*Internal Jl Leprosy* Manila. 1941 Apr-June Vol. 9 No 2 pp 193-202. With 27 figs. on 6 plates. [13 refs.]

The author reports on a study of the vascular lesions of leprosy based on 77 cases and 10 autopsies and illustrates his paper with six plates showing the microscopical appearances. In the case of the larger vessels the endothelial cells of both arteries and veins showed diffuse infection with lepra bacilli apparently resulting from spread in the endothelium. In the small arteries only large groups of bacilli were found in the smooth muscle cells. In the larger vessels the infection seemed to be spreading through the vasa vasorum especially in the subcutaneous plexus. Lepromatous thickening of a large vein and a mass projecting into the lumen of an artery were each found once. Tuberculoid changes in a large vein were also seen. Vascular involvement of the testis and of the nasal mucosa were also noted but not of the peripheral nerves or the lymph nodes. Leprosy foci apparently originate in the perivascular lymph spaces around arteries, veins and nerves but were not demonstrated in the lymphatic vessels themselves. It is probable that the bacilli are discharged from the endothelial cells into the circulation continually in lepromatous cases. Bacilli were also demonstrated in the liver and spleen. L. R.

VENKATASUBRAMANIAM (C. S.) *Investigations on the Biochemistry of Leprosy (Part I)*—*Leprosy in India* 1941 July Vol. 13 No 3 pp 104-108.

In this note the author records observations to show that in leprosy cases both calcium and phosphorus in the blood are within normal limits but phosphatase shows a definite but slight increase which is attributed to the bone changes. This is confirmed by a note by the editor pointing out that the phosphatase increase shows a higher average in the nerve than in the lepromatous type of case. A slight reduction in the total protein may be due to malnutrition. L. R.

WADE (H. W.) *Heredity in Susceptibility to Leprosy* [Editorial.]—*Internal Jl Leprosy* Manila. 1941 July-Sept Vol 9 No 3 pp 353-358. [10 refs.]

This is an instructive review of the recent literature on this subject. The suggestion of MOLESWORTH that the Middle Ages decrease of leprosy was due to the elimination of susceptibles was controverted by MUIR. AYCOCK in America regarded the family occurrence of the disease as evidence of hereditary predisposition. Muir found Europeans to be susceptible but found the disease more severe in Burmans. LOWE considers that inherent individual susceptibility is an important factor. COCHRANE regards close contact as by far the most important factor in infection. READ inclines to regard acquired constitutional weakness and malnutrition as of importance. Wade thinks that only

experimental investigations on animals susceptible to leprosy can afford definite evidence on the subject. Skin reactions to injections of leprosy bacilli might aid.

L. R.

FONTE (João) A lepra no Hawaii. Quinze anos de atividade do centro de leprologia de Honolulu (Hawaii)—(1925-1939) [Leprosy in Hawaii. Fifteen Years of Investigations at the Honolulu Centre.]—*Acta Med. Rio de Janeiro* 1941 June. Vol. 7 No. 8. pp 289-297 English summary (4 lines).

Several lines of study have been undertaken but the information given in this article is too brief and sketchy to have much value few details are given. The subjects studied include (1) Glycosuria in lepers. Of 175 patients 23 per cent. were excreting sugar whereas of 300 others examined by way of control, only a little over 3 per cent. had glycosuria. (2) Blood protein in lepers certain results have been observed but they have not yet been analysed. (3) Cytology of the blood. Exacerbations of the disease acute or subacute are preceded by leucocytosis, [polymorphonuclears] relative and absolute regression of the lesions by reduction of these and increase of large mononuclears in convalescence both are reduced with corresponding increase of small lymphocytes. (4) Sedimentation rate of red corpuscles nothing definite has resulted from this investigation into the rate of sedimentation and the clinical course of the disease. (5) The Wassermann reaction. Dr BADGER found that 29 per cent. of the patients reacted positively but among 481 controls in whom repeated examination failed to reveal clinical signs of syphilis 29.6 per cent. gave a positive while only a few more, 32.6 per cent. were positive among 834 patients attending the venereal clinic. Hence the author concludes that the Wassermann (or Kahn) reaction is of little value in differentiating leprosy from syphilis. The rest of the article deals briefly with epidemiological matters

H H S

FONTE (João) A lepra no Hawaii. Quinze anos de atividade do centro de leprologia de Honolulu (Hawaii)—(1925-1939) [Leprosy in Hawaii.]—*Acta Med. Rio de Janeiro* 1941 July & Aug Vol. 8. Nos. 1 & 2 pp 23-44 73-86 English summaries (8 lines)

In this third contribution the author sketches the bacteriology and treatment of the disease by chemotherapy, artificial pyrexia, cod liver oil, carbonic acid, sodium iodides and arsenicals and in the fourth he deals with general therapeutic measures and the treatment of special symptoms and complications such as neuritis, perforating ulcer, ocular and nasal lesions. A final section deals with miliary leprosy but contains nothing not already known to readers of this *Bulletin*.

H H S

ANXOLD (Harry L.) Jr Differential Diagnosis in Leprosy—*Arch. Dermat. & Syph.* 1941 Nov Vol. 44 No. 5. pp. 911-912

Negative results to examinations of nasal smears or to tests of sensitivity to light touch or pinprick are not enough to exclude leprosy. The principal diagnostic criteria are—Almost any form of skin lesion—or none at all—thermal anaesthesia, even in apparently normal

skin muscular weakness or paralysis most easily noted in the facial muscles irregularly thickened nerve trunks acid fast bacilli in smears from skin or scraped nasal septum histological changes. Of these criteria the most important is thermal anaesthesia which is almost invariably present in leprosy—this is by no means true of anaesthesia to light touch or to pinprick. Thermal anaesthesia can easily be tested by hot and cold test tubes. In leprosy as in other diseases bacterioscopic examinations are valuable when positive but inconclusive when negative

C W

SCHUJMAN (Salomon) *Sarcoides dermicos hipodermicos e intra musculares de origen leproso.* [Sarcoid Lesions of Leprous Origin.]—*Rev Argentina de Dermatofulologia* 1941 Vol 25 Pt 3 pp 447-460 With 10 figs. English summary

A case of leprosy is described in which cutaneous subcutaneous and intramuscular sarcoid lesions were found. Its leprous aetiology was established by the anaesthetic changes of the skin and nasal mucosal lesions by the histopathological examination which showed characteristic leprous neuritis and by the improvement observed with chaulmoogra treatment

The typical changes of the lymph nodes lungs and bones described in Schaumann Besnier Boeck disease were not observed in this case

The author maintains that this case shows that cutaneous and subcutaneous sarcoids can coexist therefore their separation is not always justified. Also that cutaneous sarcoids may exist without the lesions in bone lymph nodes and lungs described in the Besnier Boeck Schaumann disease.

ESCALONA (Ernesto) *La reacción leprosa.* [The Leprosy Reaction.]—*Medicina Mexico* 1941 Aug 25 Vol. 21 No 394 pp 365-377

WENGER (Franz) *Leprosy with Widespread Tumor-like Tuberculosis.*—*Arch Pathology* 1941 July Vol. 32. No 1 pp 112-116 With 1 fig

This is a brief illustrated account of an unusual case of lepromatous disease in an Indian aged 44 who died after suffering from cough and aphonia. At an autopsy typical dermal and the respiratory tract leprosy was found together with very large tuberculous lesions in the liver and spleen but the variety of tubercle bacillus was not ascertained. The author advises the use of Sudan III for staining the leprosy bacilli

L. R.

GREVAL (S D S) DAS (B C.) & SEN GUPTA (P C) *Preparation and Use of the Witebsky, Klingenstein and Kuhn (W K K.) Antigen.*—*Indian J Med Res* 1941 July Vol. 29 No 3 pp 527-530

Owing to Witebsky Klingenstein and Kuhn antigen being no longer obtainable from Europe the authors describe as follows the methods by which they have made a reliable preparation. It consists of a solution in benzol of (1) the alcohol insoluble (2) the pyridin soluble and, (3) the acetone insoluble fractions of the human tubercle bacillus. In making it the authors took 12 cultures, from six cases of tuberculosis grown for two months and autoclaved for half an hour in 50 cc. saline

and dried the filtrate to weight 9.078 grammes. After extraction in 20 times its weight of alcohol, filtering off and drying the bacilli, the remaining weight of 0.783 gramme was extracted in a 50 cc. Soxhlet apparatus with pyridin for 5 hours over a glycerine bath at 130°C. The pyridin solution was removed by distillation and a dried residue weighing 0.1632 gramme of the alcohol insoluble and pyridine soluble fraction was obtained. After extracting this residue with 20 cc. acetone the filtrate was washed with 3 cc. fresh acetone and dried to yield 0.075 grammes of residue which was finally dissolved in 7.5 cc. benzol and made up to a 1 per cent. solution. As it was milky 15 cc. of benzol was added in 5 cc. quantities to obtain a clear solution, and one part of 1 per cent. alcoholic solution of lecithin added to two parts of the benzol solution to make the required antigen. In the complement fixation test for leprosy and kala azar complement of optimum reaction and titre only as determined by the Wassermann reaction, is now used by the authors.

L. R.

PATRICK (D. W.) & WOLFE (D. M.) *Leprosy Complement Fixation with Gaehrig's Spirochete Antigen compared with Standard Wassermann and Kahn Tests.*—*Public Health Rep.* 1941 Aug. 29 Vol. 56, No. 33. pp. 1757-1759.

The authors have examined the statement of CAPELLI that complement fixation tests in leprosy patients with the use of Gaehrig's phenolized cultures of *Spirochaeta pallida* (palligen) give no positive 4 or 3 plus reactions in non-syphilitic patients, in contrast to those obtained with the Wassermann method. They conclude that lepers do show a tendency to falsely positive results with Gaehrig's antigen, although to a lesser degree than with Wassermann and Kahn tests.

L. R.

DHARMENDRA & JAISKARIA (S. S.) *Studies of the Lepromin Test. (2) Results of the Test in Healthy Persons in Endemic and Non-Endemic Areas.*—*Leprosy in India.* 1941 Apr. Vol. 13, No. 2. pp. 40-47. With 2 graphs.

The authors report on the reactions to the lepromin test in healthy subjects in endemic and non-endemic areas respectively. The endemic area was a highly infected part of West Bengal with an incidence of over 4 per cent. The non-endemic area was in the Punjab where a survey had not revealed a single case of leprosy. The readings were made weekly for six weeks. Tests in 296 healthy persons in the endemic area gave positive reactions in 59 per cent. with increasing incidence at higher ages until 100 per cent. was reached. In the Punjab non-endemic area only 36 per cent. of positive reactions were met with—a rise was noted up to 30 years of age, followed by a decrease. In the Bengal endemic area 22 per cent. of the positive reactions were followed by ulceration, but not in any of the endemic area people. Tuberculin tests by the Mantoux method were also carried out—these showed increased positive reactions with increasing age and except up to five years of age they were more frequently positive than the lepromin reactions. The authors therefore consider the lepromin test to be one of non-specific allergy and the findings are not incompatible with the theory that increased positive reactions with increasing age are dependent on the resistance of the tissues.

although they do not prove it to be so. Exposure to infection as well as increasing age are factors in increasing the number of positive reactions. L. R

DHARMENDRA. Studies of the Lepromin Test. (3) Preparation and Standardisation of Lepromin.—*Leprosy in India* 1941 July Vol 13 No 3 pp 77-80

The author describes a method of separating leprosy bacilli from tissues and nodules and of standardizing the bacillary content. Nodules from the ear lobes were autoclaved, ground in a pestle and mortar with carbolic saline and the supernatant fluid after settlement repeatedly centrifuged to remove tissue cells. The bacilli in the collected supernatant fluid were counted and the fluid was diluted to leave 15 million bacilli per cc. The injection of 0.1 cc. of the resulting lepromin gave good results. L. R

FERNANDEZ (Jose M. M.) & OLMOS CASTRO (Norberto). Estandarización de la lepromina [The Standardization of Lepromin].—*Rev. Argentina de Dermatofiliología* 1941 Vol. 25 Pt. 3 pp 435-446 With 9 figs. [13 refs.] English summary

A new method for preparing lepromin based on the different densities of M.L. [*Mycob. leprae*] and tissues contained in ordinary lepromin has been developed which has the advantage of permitting the obtaining of a pure suspension of bacilli and accurate standardization.

A watery suspension of ground lepromata was given a density of 1.050 with sodium chloride and then centrifuged the majority of the bacilli remained suspended in the fluid while the cells were precipitated. Alcohol was then added to the separated fluid adjusting it to a density of 0.950 centrifugation precipitated the majority of the bacilli. This sediment was dried in a vacuum and ground to a fine powder. A 1 per cent. suspension was prepared by weighing the appropriate amount and then dilutions of 1/10, 1/100 and 1/1000 were made.

This preparation called bacillary lepromin produced positive reactions in allergic cases and negative reactions in anergic ones. Comparative tests made with different batches of bacillary lepromin and Mur's and Hayashi's lepromin gave similar reactions those of the bacillary lepromin being of more uniform intensity. A direct relation between the concentration of the bacillary lepromin injected and the intensity of the skin reaction was observed.

LOWE (John) & DHARMENDRA. Studies of the Lepromin Test. (4) The Early Reaction to Lepromin, its Nature and its Relation to the Classical Mitsuda Reaction.—*Leprosy in India* 1941 July Vol 13 No 3 pp 81-88 [11 refs.]

The authors have studied the relations of early and late reactions to lepromin prepared as described above. They concur in the earlier finding of FERNANDEZ that cases giving the typical late reaction after three to four weeks also gave an early reaction of a less marked nature. Thus among 300 tests 85 per cent gave both early and late reactions and in only 6.7 per cent did the early and late reactions differ. The

early reaction is characterized by erythema half an inch or more in diameter accompanied by an appreciable degree of oedema and thickening of the skin of the whole area. They proceeded to carry out tests with their lepromin after breaking down the bacillary content by grinding, and found the early local reaction to be accelerated from 84 to 24 hours and to be increased in extent, and the degrees of the late lepromin reaction to be considerably diminished. They therefore disagree with Fernandez's suggestion that lepromin contains two antigens responsible respectively for the early and late reactions; they regard the late reaction as being due to the gradual breaking up of the lepra bacilli at the seat of injection, and the early one to the same antigen set free from the bacilli by grinding and to be of an allergic nature. Positive results have also been obtained in healthy non-contacts. L. R.

DR. RAOBHENDRA. Studies of the Lepromin Test. (b) The Active Principle of Lepromin is a Protein Antigen of the Bacillus.—*Leprosy in India*. 1941 July Vol. 13 No. 3. pp. 89-103. (13 refs.)

This paper records promising results regarding the fractionation of lepromin in order to obtain the antigen in a soluble form. The conclusion reached, that the antigen of lepromin is contained solely in the lepra bacilli, and not in the tissues of a nodule and that it can be obtained in a soluble form by breaking up the separated lepra bacilli to produce an early local reaction on injection, led to attempts to fractionate the dried bacillary powder separated from leprosy nodules. These observations led to the conclusions (1) that no isolated fraction gives a late reaction, (2) that only the protein content, and not the lipid fractions, gives rise to a definite early reaction. A comparison between the late reactions with ordinary lepromin, and early ones with the ground-up material, gave agreement in 88.9 per cent. of 60 cases. The early reaction with a pure antigen is easy to perform and to read and is as sensitive as the former test without the disadvantage of a long wait and undesirable late reactions. L. R.

REINHOLD (Elman). Beitrag zur Frage der Rubinreaktion. (Rubino Reaction.—*Dtsch. Tropenmed. Ztschr.* 1941 Aug. 15. Vol. 45 No. 16. pp. 496-505. 50 refs.)

After discussing the nature and technique of the Rubino reaction, the author summarizes in tables the results obtained by various observers and arrives at the following conclusions. The Rubino reaction is specific in the diagnosis of leprosy. It only gives an insignificant number of positive reactions in control non-leprosy cases, namely 0.98 per cent. among 14,050 collected data. Of 1,551 cases of leprosy of all forms combined positive reactions were obtained in 67.5 per cent. In the different forms, among 702 cases, nodular leprosy gave 71.3 per cent. mixed 71.7 nerve 33.0 and maculo-anæsthetic 19.8. For its use in the diagnosis of doubtful suspected cases of leprosy the evidence as yet is inconclusive. Tuberculous gives no specific results with the test. The reaction is a distinct one and unrelated to the sedimentation, Wassermann and flocculation tests for syphilis. Generally speaking it suffices to perform the test with one small tube. (See also this Bulletin 1939 Vol. 36 pp. 691-693) L. R.

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION MADRAS PROVINCIAL COUNCIL. Annual Report 1940-41.—37 pp Printed at the Arpudha Press Chingleput.

This report presents the following points of interest in addition to those of only local importance. A further trial of skimmed milk in the diet of lepromatous patients has not confirmed the very favourable conclusions from a former trial but the observations are being continued. Further trials of adding the rather unpalatable ragi to wheat in a diet indicate that it may be of some value in relieving chronic nerve and bone pain. A trial of M. & B 693 [sulphapyridine] showed that it is liable to produce severe and injurious febrile reactions without being followed by any benefits so this drug is definitely contraindicated in leprosy. A non-irritating ethyl ester of chaulmoogric acid supplied by COLE from S America was well tolerated and promising as far as limited trials indicate. The Siam diphtheria anti toxin and formol toxoid treatment did not confirm the claims of its originators. Further work on childhood leprosy indicates that the percentage of negative lepromun tests increases with the degree of the exposure of the children to family contact with infective cases of leprosy

L. R.

COLE (Howard Irving) & CARDOSO (Humberto T) Analysis of Chaulmoogra Oils.—*Internat J Leprosy* Manila. 1941 Apr-June Vol. 9 No 2 pp 215-228.

This is an important paper recording the first quantitative analysis of the chaulmoogra oils *Hydnocarpus wightiana* *H anthelmintica* and *Taraktogenos kurzii* so much used in the treatment of leprosy. The most important earlier work was that of POWER & GORNAL and POWER & BARROWCLIFF in 1904 and 1905 since which little has been done. The following table constructed by combining two tables in the paper shows the main points.

Percentage composition of the fatty acids of chaulmoogra oils

	<i>H wightiana</i>	<i>H anthelmintica</i>	<i>Taraktogenos kurzii</i>
Hydnocarpic	48.7	67.8	34.9
Chaulmoogric	27.0	8.7	22.5
Gorlic	12.2	1.4	23.6
Oleic	6.5	12.3	14.6
Palmitic	1.8	7.5	4.0
Lower homologues of chaulmoogric acid	3.4	0.1	0.4
Loss	0.4	2.2	1.0

Analysis also showed that *H wightiana* oil is quite similar in composition to that of the Brazilian *Carpotroche brasiliensis* oil.

The authors point out that if gorlic acid should prove the most effective fraction of the oil in the treatment of leprosy then the oil of *Taraktogenos kurzii* may be the most effective although the difficulty of obtaining it pure from the Burma forest during the rainy season led to the preference for the hydnocarpus oils. However they obtained

pure oil from the Burma trees successfully grown in Brazil and found it to keep well. On the other hand if the *Hydnocarpus* fraction is the most effective (as ROGERS found it to be in Calcutta) then the *Hydnocarpus* oils will be the best especially the *H. anthelmintica* of Indo-China if still obtainable.

From the chemical point of view the most interesting part of this highly technical paper relates to the fraction shown in the table as the lower homologues of chaulmoogric acid for although forming but a small part of the oils no less than five new substances have been found four of which have been isolated and described under the names of aleproic, aleprylic, aleprestic and aleprolic acids. The first two have melting points of 48° and 32°C respectively which are lower than those of chaulmoogric and *Hydnocarpus* acid. Owing to the great difficulty of isolating them in any considerable amounts they appear to be of more theoretical than practical value. L. R.

CHAUSSINAND (R.) in collaboration with J. GUILLERM. Contribution à l'étude de la lèpre. III. Traitement de la lèpre humaine par le Krabao (*Hydnocarpus anthelmintica* Poir.) [Treatment of Human Leprosy with *H. anthelmintica* OIL.]—*Internat. J. Leprosy* Manila 1941 July-Sept. Vol. 9 No. 3 pp. 327-340. With 10 figs. on 2 plates. [14 refs.]

The authors describe the results of their treatment of 375 cases of leprosy with various preparations of *Hydnocarpus anthelmintica* oil, locally known as Krabao and give photographs of cases. At dispensaries out-patients were treated by the sodium soap made from the oil, orally in doses of six tablets of 25 cgm. each three times a day which were well tolerated and as effective as larger doses. This form of treatment can be continued for years with intervals of a few weeks. It proved to be of value especially in early cases, and popular with the patients. The authors also think it should be of great value in the prophylactic treatment of children living in contact with leprosy patients. In more advanced cases it seldom clears up the lesions. In patients requiring more active treatment they prefer the ethyl ester undistilled and unneutralized, prepared by cold extraction from the oil. These have been given intradermally, intravenously, intrarterially, intramuscularly and subcutaneously with intramuscular injection for choice. Remarkable results have been obtained in out-patients at little cost. In Cochin China the segregation laws are not applied severely and they have not resulted in any appreciable results in reducing the disease, but cause hiding of cases, minimal to dispensary treatment and prophylaxis. Dispensary treatment is therefore recommended, combined with rigorous segregation of those who refuse treatment and are a danger to the community [See this Bulletin 1940 Vol. 37 p. 634]. L. R.

EMERSON (G. A.) Some Pharmacologic Effects of the Choline Ester of Chaulmoogric Acid.—*Internat. J. Leprosy* Manila 1941 July-Sept. Vol. 9 No. 3 pp. 341-345. With 1 fig.

The authors report on the pharmacology of one of the many chaulmoogra derivatives, prepared by WHEENSHALL in Hawaii, namely chaulmogrylcholine or the chaulmoogric acid ester of choline. Their results bear out the importance of their view regarding the necessity

to ascertain the toxicity and physiological actions of a new preparation before using it clinically for its chloride proved to be too toxic for human use in significant amounts. Thus it has a depressor effect on the circulation not completely antagonized by atropine and on muscular action. It also has a high haemolytic activity and a harmful effect on tissues. It is not therefore suitable for trial in leprosy cases.

L R

COLLIER (D R.) The Effects of Diphtheria Toxoid on Painful Enlarged Nerves in Leprosy.—*Internat J Leprosy* Manila. 1941 Apr-June Vol. 9 No. 2. pp 177-180

This brief note records four cases in which the administration of diphtheria toxoid was followed by relief of the pains in cases of enlarged nerves of leprosy. Previously operations on such painful nerves had only given temporary relief on account of the formation of scar tissue. It is stated that the new treatment has given satisfactory results in more than 300 cases. Temporary hot and itching sensations and increased pain in the hands and feet may occur after the injections.

L R

McKEAN (J Hugh) Limitations of the Diphtheria Toxoid Treatment of Leprosy.—*Internat J Leprosy* Manila. 1941 July-Sept Vol. 9 No 3 pp 309-314

— Limitations of Toxoid Treatment. [Correspondence]—*Ibid* p. 359

The author records his experience of the diphtheria toxoid treatment of leprosy at the Chungmai Leper Asylum during 18 months. He states that the limitations of the treatment were evident from the beginning and he quotes the statement of COLLIER in his third report that the response to the treatment was not uniform. Indeed, wide variations were noted in the same class of cases. The best results were seen in tuberculoid cases with few bacilli and in early neural cases just those that do best under chaulmoogra treatment. The earlier lepromatous cases (L1) showed excellent results at first but 3 of 21 relapsed, so the permanence of the improvement in the others requires further observation. The treatment proved to be of no value in either major tuberculoids with numerous bacilli, or in the papular type of lepromatous cases and even active minor tuberculoids free from bacilli failed to respond. In early favourable cases the results appear quickly. In cases which relapse further treatment is of little use, and new activity tends to appear in other parts of the body. In only 38 of 286 cases was unusually great fragmentation of bacilli noted.

[In connexion with the failures of several experienced workers to confirm the beneficial results of diphtheria toxoid treatment claimed by the Thailand workers it may be well to call attention to a leading article on the subject in the *Internat J Leprosy* 1941 Vol. 9 p 229. In this it is pointed out that not since the first trial of the aniline dyes has so much been claimed for a therapeutic innovation as in the case of diphtheria toxoid by the Thailand workers. The hypothesis of adrenal deficiency in leprosy on which its use is based, together with the assertion of OBERDOERFFER that the consumption of *Colocasia* predisposes to leprosy still lacks any reliable basis, consequently as yet indeed there can be seen no justification for employing this

treatment on any other than an experimental basis. An addendum to this editorial expresses regret that an article entitled "New hope for the Leper" has appeared in a popular American magazine illustrated by a posed photograph of Dr Collier. See also this *Bulletin* 1941 Vol. 38 pp. 26, 704]

L. R.

DAVISON (A. R.) & GRASSET (E.). Diphtheria Toxoid in the Treatment of Leprosy. Clinical and Immunological Investigations.—*Leprosy Review* 1941 Oct. Vol. 12 No. 4 pp. 68-79

This is a careful record of a trial of diphtheria formal toxoid in South Africa by experienced workers. One hundred cases were treated with doses of 0.5 cc. increased to 10 cc. over a period of seven months, in accordance with the suggestions of COLLIER of Thailand, and the results were assessed nine months from the beginning. The diphtheria formal toxoid used was prepared in the South African Institute for Medical Research. In 16 of the patients the Schick test was carried out before immunization and their blood antitoxin titrated before and after treatment, with satisfactory immunization response in a majority as shown in a table. No relation could be found between the antitoxin titre after the toxoid treatment and the clinical changes in the treated patients. In one group diphtheria toxoid alone was used and in three other groups this was supplemented respectively by an emulsion of the whole diphtheria bacillus, tubercle bacillus endotoxoid or a killed emulsion of a culture of a tubercle bacillus which had lost its acid-fast properties.

Tables are given of the results in all four series of cases. In Group I of 43 cases treated with diphtheria toxoid alone, four only showed marked improvement—all were neural cases which would have responded equally well to intradermal hydnicarpus ethyl esters. In Group II of 11 cases treated with toxoid and *C. diphtheriae* emulsion the disease was not favourably influenced. Nor were satisfactory results obtained in smaller series of the other two groups. The treatment was voluntary and only 71 of the 100 were willing to complete the full course although leprosy patients will persevere with any treatment when they can observe any improvement. No improvement occurred in either body weight or the sedimentation test. Only five cases became negative bacteriologically but six previously negative cases became positive while under the treatment. The results are summarized in the statement that out of 72 (? 71) who completed the course of diphtheria toxoid treatment, 12 became worse, 34 showed no appreciable clinical change, 21 showed slight improvement and 5 only a marked improvement, or 6.94 per cent. compared with 50 per cent. or more claimed by Collier in Thailand.

The authors remark that Collier's theory that suprarenal inefficiency was a necessary predisposing cause of leprosy seemed strange to them in view of the fact that not one case of such gross deficiency could be traced among nearly 5 000 leprosy cases that had passed through their hands. They therefore recorded the blood pressures in 100 unselected cases and found them to be entirely within the normal limits. Further in eight successive post mortems in non-treated cases, no anatomical degeneration of the suprarenals could be discovered. They are unable to give any explanation for the very limited therapeutic results as compared with those claimed by Collier.

L. R.

INTERNATIONAL JOURNAL OF LEPROSY Manila 1941 Apr-June
Vol 9 No 2 pp 229-235 [17 refs.]—Diphtheria Toxoid in Treatment and the Adrenal Injury Theory

MONEY (T D F) The Oji River Settlement and Clinics. Report on the Year 1940—*Leprosy Review* 1941 Oct. Vol. 12. No 4 pp 79-89

COWDREY (E. V) & RUANGSIRI (C) Influence of Promin, Starch and Heptaldehyde on Experimental Leprosy in Rats.—*Arch Pathology* 1941 Oct Vol. 32. No 4 pp 632-640 With 1 chart. [15 refs.]

The authors report on chemotherapeutic experiments in rat leprosy. Promin has been reported in the case of tuberculous guinea-pigs to lengthen life and reduce the lesions. Trials carried out in rat leprosy with careful measurement of the lesions showed that from about 60 to 140 days treatment caused material diminution in the size of the leprosy nodules together with a united survival time increase of 1 258 to 1 583 days but no material difference in the microscopical characters of the lesions. The injection of starch was followed by temporary healing in some nodules in controls as well. Injections of heptaldehyde into nodules had no beneficial effect. L R

TRYPANOSOMIASIS

REICHENOW (E) Zur Frage der Bedeutung des Blepharoplasts der Trypanosomen. [Function of the Blepharoplast of Trypanosomes.]—*Archivos do Inst Biol* Buenos Aires. 1940 Vol. 11 pp 433-436

The author discusses the function of the blepharoplast or kinetoplast of trypanosomes and notes that as far as continued development in the vertebrate is concerned it appears superfluous for *Trypanosoma equinum* and certain strains of *T. evansi* which are devoid of it can be passed indefinitely by blood inoculation from animal to animal. Whether this is true of development in the invertebrate has not yet been determined though certain facts suggest that it may not be so. The trypanosomes which are most liable to lose the blepharoplast are those of the *T. evansi* group which are transmitted by flies mechanically. Those of *T. brucei*, *T. vivax* and *T. congolense* which undergo cyclical development in their transmitting hosts are much less liable to this modification. It is known, however that if infected animals are treated with trypanflavin as many as 70 per cent. of the trypanosomes may lose the blepharoplast and this loss having once been sustained, the blepharoplast does not reappear in subsequent passages. It would be of interest to test the possibilities of development of such a modified strain in tsetse flies but the experiment would be difficult to carry out. Some light might be thrown on the question by cultivation of a modified strain in the test tube. Accordingly the author subjected to the action of trypanflavin a strain of *T. gambiense* which he had shown to be readily cultured. When the trypanosomes in the animals had arrived at a condition in which 70 per cent. had no blepharoplast, culture was again attempted. This was just as successful as before but it was found that all the cultured forms possessed the blepharoplast. During two

months of culture no change was observed. As the culture appears to be an mutation of the development in the fly it would seem that the ablepharoplastic trypanosomes would be incapable of a cyclical development.

C. M. Wernon

ROUBAUD (E.) & PROVOST (A.) Manifestations neurotropes d'une souche de *Trypanosoma gambiense* chez la souris. [Neurotropic Manifestations of a Strain of *Trypanosoma gambiense* in the Mouse.—*Bull. Soc. Path. Exot.* 1941 Vol. 34. Nos. 1-3 pp. 48-50 With 1 fig.]

Although as long ago as 1903 Plummer observed in rats, infected with *Trypanosoma gambiense* infections characterized by posterior paralysis and with trypanosomes detectable only in the spinal marrow but little attention has been paid to the neurotropic manifestations of *T. gambiense* in the small rodent. It is generally considered that the infections in these animals are blood infections varying according to the virulence of the strain employed.

In the present paper the authors record some observations concerning a strain isolated from man in the Cameroons and since maintained in the laboratory by passage through guinea-pigs and mice. This strain has not become fixed for the animals in which it has been maintained. The infections are characterized by very great irregularity. In very young animals there is often an arrest of growth, but this phenomenon is not observed in animals some months old. In the latter however from time to time more or less pronounced posterior paralysis, with very few trypanosomes visible in the circulation, has been observed. Illustrations are given.

On the 18th August, 1939 two mice were inoculated subcutaneously with the trypanosome. In one trypanosomes were seen in the blood fairly regularly. It died on January 4th, 1940 with numerous trypanosomes in the peripheral blood and without any paralytic signs. In the second mouse very rare trypanosomes were seen in the blood on the 3rd, 5th and 11th September but not again up to the time of death on the 15th May. In the middle of January this animal, however presented paraplegic manifestations of the posterior limbs and intestinal incontinence. In the following month the posterior paralysis was complete. Although trypanosomes could not be seen in the peripheral blood after the 11th September the blood inoculated into two mice on the 4th and 28th February 1940 infected a mouse on each occasion. A third attempt to infect mice, made on the 1st April, was negative. On the day of death, three mice were inoculated with an emulsion of brain, and one of them became infected.

The other observations recorded are comparable. The authors conclude that this particular strain of *T. gambiense* is clearly differentiated from other strains maintained for many years in the laboratory by the irregularity of the infections and the neurotropic manifestations which it produced in mice.

W. Yorke

NASH (T. A. M.) Bats as a Source of Food for *Glossina morsitans* and *G. tachinoides*.—*Bull. Entom. Res.* 1941 Nov. Vol. 32. Pt. 3. p. 249.

Glossina morsitans and *G. tachinoides* are able to feed with ease on the bat *Myotis bispada* found in Nigeria. It is possible that when

floods force the game to evacuate the tsetse-infested river plain these bats form a very important source of food for the flies especially *G. tachinoides* C II

HAWKING (F) & GREENFIELD (J G) Two Autopsies on Rhodesian Sleeping Sickness, Visceral Lesions and Significance of Changes in Cerebrospinal Fluid.—*Trans Roy Soc Trop Med & Hyg* 1941 Nov 29 Vol. 35 No 3 pp 155-164 With 5 figs on 2 plates.

This paper describes post-mortem examinations made on two cases of *T. rhodesiense* sleeping sickness, the points of special interest being —

- (1) No effective treatment to modify the natural development of the disease
- (2) The marked visceral lesions
- (3) The slowness of the lesions in the central nervous system and the correlation with the changes in the cerebrospinal fluid.
- (4) The concomitant infection with tuberculosis.

The first patient had been ill for six months. He complained of headache and pain in the chest. He was emaciated and could walk only with difficulty. The liver and spleen were moderately enlarged, as also were the lymphatic glands. The intelligence was fair there was no evidence of lesions of the central nervous system. Numerous trypanosomes were found in the blood. The cerebrospinal fluid contained trypanosomes 14 cells per cmm. and 0.025 per cent of protein. The patient was treated with undecane diamidine for 4 days and the blood became free from trypanosomes but the cerebrospinal fluid remained unchanged. A few days later trypanosomes reappeared in the blood the patient was given 1 gm. of germanin but died 12 hours later. A detailed account of the post mortem of this case is given and the pathological changes are summarized as follows

Trypanosomal septicaemia.

Inflammatory effusions containing trypanosomes in pleura, pericardium and peritoneum.

Subacute inflammation of heart principally myocardium and epicardium

Numerous trypanosomes in cerebrospinal fluid, but the tissues of the nervous system were practically normal and the meninges were only slightly involved.

Tubercular consolidation of parts of both lungs and tubercular foci in the mesenteric and other lymph nodes and in the liver and spleen

The second patient had been ill for 4 months with pains in the head thorax abdomen and legs. He was a very emaciated old man who could stand and walk with difficulty only. The liver was enlarged there was marked oedema of the ankles and the patient was demented. The blood contained numerous trypanosomes and the cerebrospinal fluid many trypanosomes 10 cells per cmm. and the protein was 0.028 per cent. The patient was given 1 gm. of germanin, but died three days later. Here again a full account of the post mortem is given. The pathological changes are summarized as follows —

Trypanosomal septicaemia.

Inflammatory effusions containing trypanosomes in pleurae, pericardium and peritoneum

Subacute inflammation of heart principally myocardium and epicardium. Numerous trypanosomes in C.S.F. but tissues and membranes of brain only slightly involved.

Tubercular foci in lungs, liver spleen and lymph nodes "

After discussing their findings, the authors give the following summary:

"Two autopsies are described of cases of *rhodense* sleeping-sickness, in which no appreciable treatment had been received. There were extensive trypanosomal effusions in the pleural, peritoneal and pericardial cavities, and marked inflammation of the myocardium, epicardium and endocardium. These visceral lesions were closely similar to those described by PERUZZI in the trypanosomiasis of monkeys. The cerebrospinal fluids of these cases contained numerous trypanosomes but the cell-count and protein content were not much raised—corresponding to this pathological pattern in the fluid, the histological lesions in the central nervous system were very slight, being limited to a histiocytic infiltration of the cerebral membranes. From these cases and from experiments *in vitro*, it is concluded that it is not possible to have a true invasion of the cerebrospinal fluid by trypanosomes until the protein content is considerably increased. In the absence of treatment, the visceral lesions of *rhodense* sleeping-sickness are probably more often fatal than the lesions of the nervous system.

"These two cases also suffered from widespread infection with tuberculosis.

H. Y.

VAN ZYL (M. J.) & GEAR (James). An Untreated Case of Trypanosomiasis.—*South African Med J* 1941 July 26 Vol 15 No 14 pp 278-280

This paper gives an interesting account of the course of sleeping sickness in two brothers who contracted the disease about the same time in 1939 near Mamm in Ngamiland, Northern Bechuanaland. One of the brothers was a faith healer by profession, and resolutely refused all treatment until he died, thus giving a unique opportunity to follow the natural course of the disease through all its phases, uninfluenced by drugs.

The two brothers entered the fly belt on the 9th July and remained within it for six days. On the 12th and 13th July they were frequently bitten by tsetse and they noticed that the bite marks differed from those received in other areas in that they became swollen hard and indurated, with purplish discoloration of the surrounding tissue. Both brothers apparently became ill about the 22nd July. The faith healer experienced cold shivers and developed a high fever and later in the night became delirious. An erythematous rash was seen over his chest and back. His temperature remained high for five days during which he was delirious. The acute symptoms then subsided, leaving him pale and weak, though shortly afterwards he was able to get up. On the 18th August, the possibility that he was suffering from trypanosomiasis was brought to the notice of the Public Health Department of Springs, and a visit was paid to his home. The patient although up and about appeared ill, and was pale and slightly emaciated. He complained of feeling weak. His skin was dry and his complexion sallow—no rash was visible. The pulse was rapid and rather weak, the posterior cervical glands were enlarged but not tender and the spleen was palpable but not tender. There was no marked abnormality in the nervous system, although a slight tremor was observed in the tongue and hands. On August 24th, numerous trypanosomes were found in the blood. In spite of every warning that the disease would end fatally and in spite of every persuasion, the patient persisted in his refusal to submit to treatment. For a month

and a half he improved considerably and was able to resume work, but two months after he had been first examined he complained of great weakness and recurrent digestive disturbances. Trypanosomes were again found in the blood. Thereafter the patient gradually got weaker and more debilitated. Signs and symptoms of nervous involvement appeared, and the patient was soon compelled to take to his bed. He had a convulsive attack on the 18th December and died from congestion of the lungs and cardiac failure on the 23rd December within six months of contracting the disease.

In contrast the other brother who apparently had no objection to drugs was given seven injections of Bayer 205. He was discharged from the nursing home feeling perfectly well, and since that time now 18 months ago there has been no recurrence of symptoms. IV Y

BRAZZAVILLE [AFRIQUE FRANÇAISE LIBRE] RAPPORT SUR LE FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR EN 1940
[CECCALDI (Jean) Director] pp 67-81—Service de la surveillance de la maladie du sommeil [Sleeping Sickness Service]

During the year 1940 one new case of sleeping sickness was found amongst 198 Europeans examined, and seven old cases have been kept under observation. The number of new cases found amongst natives was 209 of the 545 old cases kept under observation, 56 were discovered more than 10 years ago 97 more than five years ago and 380 less than five years ago. In the case of 12 others coming from the interior of the colony it has not been possible to ascertain the date of their diagnosis.

Dealing with the disease amongst Europeans it is recorded that the seven old patients have remained in excellent health. Clinical details are given of the new case discovered in 1940 and of a case discovered in 1939. These call for no comment.

Information is given regarding the method of diagnosis of the 209 new cases discovered amongst the natives and of the methods and general results of treatment. In a table the progress is shown of the 533 old cases the date of infection of whom is known and who are still under observation. Of these 140 appear to be cured 258 are doing well 103 are progressing 9 have had blood relapses 22 are dead and one has been re-infected.

The paper ends with a description of the patient who was re-infected. This patient was found to be infected in 1929, when she was seven years old. She was treated with tryparsamide and apparently cured. Numerous observations were made on her spinal fluid between March 1930 and January 1939. In June 1940 she became ill and lumbar puncture showed an excess of cells and of protein and the presence of trypanosomes. The author considers that the long period of observation viz 10 years in the course of which the patient appeared to be perfectly well and exhibited no signs of the disease warrants the conclusion that it is a clear case of re-infection. IV Y

VAN DEN BRANDEN (M.) Considérations au sujet du séro-diagnostic de la trypanosomiase [Sero-Diagnosis in Trypanosomiasis].—Bull Soc Path Exot 1941 Vol 34 Nos. 1-3 pp 81-84

LANDSTEINER and SCHEER obtained complement fixation reactions and positive flocculation reactions (Sachs-Georgi) in rabbits experi

[April, 1942]

mentally infected with *Trypanosoma equiperdum* and also in rabbits injected with dead *T. equiperdum*. Somewhat similar observations have been made by other workers.

As the author had at his disposal rabbits infected for many months with *T. brucei* he decided to examine whether he could obtain a complement fixation reaction, either with antigen consisting of an alcoholic extract of *T. brucei* or with the antigen of Bordet Ruelens, which is an alcoholic cholesterol extract of the heart of a calf. In the preparation of the trypanosome antigen, the parasites were isolated by fractional centrifugation of the blood of infected rats and, after washing were suspended in a mixture consisting of equal parts of pure glycerine and physiological saline. The fixation of the complement was established in doses of 0.2 cc. of serum inactivated at 58°C. for 45 minutes, and in doses of 0.05 and 0.025 cc. of antigen. In all the experiments the serum of normal rabbits was used as a control.

The maximum duration of the *T. brucei* infection in rabbits is 58 days but the animals were kept alive beyond this limit by the administration of small doses of an antimonial. The infected animals were in good general health at the time the blood was removed. It appeared necessary to make the test on animals which had been infected at a certain time in order that they might have had an opportunity of elaborating the immune bodies in their blood. The serum of guinea pigs infected 12 days and of rats at the height of the infection always gave negative results. The serum of 11 out of 12 infected rabbits gave positive results. In the rabbit in which the reaction was anti-complementary a positive reaction was obtained 15 days later so that in reality all 12 animals gave a positive result. The serum of these rabbits did not give positive results with the artificial antigen of Bordet Ruelens and the normal rabbits likewise failed to give a positive result. Four of the 12 infected animals were treated with Moramyl. Three weeks after the last dose the complement-fixation reaction was negative in all the animals. In order to see whether the reaction would occur with a non-specific antigen, van den Branden used an alcoholic extract of *T. equiperdum*. Of the eight rabbits infected with *T. brucei* six gave a clearly positive reaction with the *T. equiperdum* antigen.

In conclusion, the author considers that these observations indicate the possibility of applying the complement fixation reaction in the diagnosis of human trypanosomiasis, and for prognosis during treatment. The employment of a specific antigen for sero-diagnosis of human trypanosomiasis raises the difficulty however of obtaining a suitable antigen, because the blood of laboratory animals infected with *T. gambiense* is not sufficiently rich in parasites.

HAWKING (F) & SMILES (J) The Distribution of 4,4-Diamidino stilbene in Trypanosomes and Mice as shown by Fluorescence.—
Ann Trop Med & Parasit 1941 Oct. 21 Vol. 35. No 1
pp 45-52. With 5 figs on 1 plate

This paper describes the distribution of 4,4-diamidino stilbene in trypanosomes and in the organs of mice as shown by its fluorescence. When exposed to ultra violet light, dilute solutions of the compound in distilled water show a brilliant blue fluorescence which is visible down to dilutions of 1/100 million to 1/1000 million. The technique used is described in detail, and the article is illustrated by a plate

showing the appearance and of the culture medium.

The following

1. 4,4-diamidino stilbene is shown to be a fluorescent compound in trypanosomes. 2. The compound is shown to be a fluorescent compound in mice. 3. In mice the compound is shown to be a fluorescent compound in the blood, spleen, liver, and other organs. 4. The compound is shown to be a fluorescent compound in the blood, spleen, liver, and other organs of mice.

Annals of

parasitology

1941

Vol. 35

No. 1

pp. 45-52

With 5 figs on 1 plate

This paper describes the distribution of 4,4-diamidino stilbene in trypanosomes and in the organs of mice as shown by its fluorescence.

When exposed to ultra violet light, dilute solutions of the compound in distilled water show a brilliant blue fluorescence which is visible down to dilutions of 1/100 million to 1/1000 million. The technique used is described in detail, and the article is illustrated by a plate

showing the appearance and of the culture medium.

The following

1. 4,4-diamidino stilbene is shown to be a fluorescent compound in trypanosomes. 2. The compound is shown to be a fluorescent compound in mice. 3. In mice the compound is shown to be a fluorescent compound in the blood, spleen, liver, and other organs. 4. The compound is shown to be a fluorescent compound in the blood, spleen, liver, and other organs of mice.

showing the appearances under ultra violet illumination of trypanosomes and of the organs of a mouse which have been exposed to diamidino stilbene

The following summary is given —

1 4,4-diamidino stilbene shows brilliant blue fluorescence when exposed to ultra violet light. This property has been used to study its distribution in trypanosomes and in mice

2. The compound is absorbed by (living) trypanosomes in large quantities. It is deposited in the blepharoplast and in granules in the cytoplasm of the anterior portion of the organism

3. In mice which have received the compound subcutaneously it seems to collect especially in the liver and kidney and possibly also in the small intestine and skin. It is excreted in the urine but probably not in the bile. Excretion in the urine is marked during the first seven hours after injection and ceases within two days.

4. Palmatine seems to collect especially in the pancreas, as shown by fluorescence under ultra violet light.

W Y

MAYER (Martin) Ueber morphologische Veränderungen an Blutparasiten durch einwirkung Chemotherapeutischer Substanzen. Die Wirkung von Synthalin (Dekamethylen Diguanidin) auf Trypanosomen und Leishmanien. [The Morphological Changes in Blood Parasites caused by Chemotherapeutic Substances. The Action of Synthalin (Decamethylene Diguanidine) on Trypanosomes and Leishmania].—*Archivos do Inst Biol* Buenos Aires 1940 Vol. 11 pp 229-234 [15 refs.]

The author reviews briefly previous work on the mode of action of drugs. He points out that as long ago as 1909 WERBITZKI and shortly afterwards others of EHRLICH's school showed that by the administration to infected animals of certain dyes belonging to the pyronin acridin and oxazin series and also of fuchsin and trypanosan it was possible to produce blepharoplastless strains of trypanosomes. Subsequently Mayer himself made a further contribution to the selective action of drugs on definite constituents of the parasite-cell when he showed that the first effect of germanin is to inhibit division of trypanosomes. The nucleus and the blepharoplast divide and sometimes also the flagellum but the cytoplasm loses its capacity to divide so that broad forms with two or several nuclei arise with remarkable prolongation of the posterior end and destruction of the flagellum apparatus finally forms without blepharoplast or nucleus can be found.

This demonstration that different therapeutic substances acted on different parts of the cell gave rise to the idea that good results might be obtained by combined therapy of two differently acting substances. The work of STEFFAN (1922) showed that various dyes caused injury primarily to the cytoplasm of the parasite and that antimonials acted on the nucleus.

In malaria the work of SIOLI and JAMES showed that the so-called atebirin forms exhibited quite different appearances from the quinine-forms. According to James the atebirin forms show an aggregation of the pigment followed by its complete extrusion from the parasite and the cytoplasm becomes thin, torn and vacuolated.

JANCSÓ who showed that synthalin exerted a trypanocidal action described the morphological changes produced by the compound

these closely resembled those produced by germanin. Mayer examined the action of synthalin in mice infected with *T. brucei* and *T. equiperdum*. He noticed that in blood films of the treated animals many blepharoplastless trypanosomes appeared, but he did not succeed in producing a permanent blepharoplastless strain similar to that resulting from the administration of the dyes mentioned above. Mayer believes that the action of synthalin is primarily on the blepharoplast, and thus differs from that of germanin.

The paper closes with a brief account of two experiments on the treatment by synthalin of hamsters infected with leishmania. In smears from liver puncture many blepharoplastless parasites were seen.

W Y

HUMPHREYS (Eleanor M.) & DONALDSON (Lillian) Degeneration of the Adrenal Cortex Produced by Germanin.—*Amer. J. Path.* 1941 Sept. Vol. 17 No. 5 pp 767-775 With 4 figs. on 2 plates.

The possibility that germanin might injure the adrenal glands was suggested by the findings at autopsy of a patient with pemphigus who had been treated with this drug. In the present work, the authors have examined the point in experimental animals.

Germanin was administered to 100 guineapigs, 30 rats, 8 rabbits and 3 dogs, in the form of a 10 per cent. solution in freshly boiled distilled water. The drug used was the German product. The rats and most of the guineapigs were injected subcutaneously in the other animals the drug was given by the intravenous route. All the animals were given adequate diets and there was no evidence of vitamin deficiency in the control animals. The main part of this report summarizes the observations on 90 guineapigs, most of them young males weighing between 250 and 350 gm.

As the maximum single dose considered safe for the human adult is 1.0 gm. or 0.02 gm. per kilo this dose, or 0.02 gm. per kilo was employed in the present experiments as the minimum single dose in serial injections imitating courses used in human therapy while larger single and serial doses were used to ascertain injurious effects. Details of the dosages employed in the 90 guineapigs are given in a table.

The animals that died, and surviving animals, killed from 1 to 21 days after the last injection, were autopsied as soon as possible. Those showing pneumonia or other disease were excluded. The kidneys and adrenals were fixed and embedded together in order to standardize the planes of section and to permit rough comparisons of size. Usually sections of the liver and heart, and sometimes of other tissues, were prepared. Sections of kidneys, liver and heart were examined for fat.

Adrenal cortical lesions were found in 11 of 12 guineapigs which had received single injections of 0.1 to 0.4 gm. of germanin per kilo. These were constantly located in the outer part of the fasciculate zone, sometimes encroaching on the glomerular zone. The type characterized as an acute degenerative band was seen in four animals, all dying early after doses of 0.3 and 0.4 gm. per kilo the established lethal dose for the guineapig. Lesions characterized as reactive bands

were seen in animals which survived doses of 0.1 to 0.3 gm per kilo. It is interesting to note that no changes were found in the adrenals of guinea pig no. 12, which was killed 21 days after an injection of 0.1 gm a dose which invariably produced zonal lesions and consequently it seems likely that the interval of three weeks had sufficed for complete healing.

Twenty guinea pigs were given series of injections of single doses of 0.03, 0.05 or 0.1 gm. per kilo each. Twelve of these were treated intensively with injections on alternate days while in 8 the injections were spaced 8 days apart. Eleven animals of the former group died or were killed because they were moribund while only two of the latter group died. The difference is especially significant because most of the members of the latter group were given larger single and total doses. The character of the zonal adrenal lesions present in all varied considerably. In some there were acute degenerative bands, in others there were mixed degenerative-reactive bands, whilst in still others belonging to the group in which the doses were given eight days apart, there was a collapsed band appearance. These bands were narrow devoid of epithelium and made up of stromal elements with wide capillaries lined by numerous flat endothelial cells. Here and there were a few lymphocytes and macrophages. There was no fibrous hyperplasia and the whole appearance suggested the condensation of a previously wider zone in which repair had been arrested. There was, however, some reparative activity at the borders, except in the animals which died.

The following are the conclusions —

Germanin in toxic doses consistently produces zonal degeneration of the adrenal cortex of small laboratory animals.

Small serial doses of germanin comparable to those in therapeutic use in man, may produce similar but less intense adrenal cortical lesions.

It is probable that germanin has occasionally caused cytotoxic atrophy of the adrenal glands in patients with pemphigus.

It is possible that other therapeutic agents may have a similar selective action and a capacity to injure the adrenal cortex.

W Y

KAMPMEIER (R. H.) Urticaria due to Tryparsamide.—*Arch Dermat & Syph* 1941 Oct Vol 44 No 4 pp 671-673 [17 refs.]

A case of generalized urticaria following the use of tryparsamide is reported. This reaction occurred on four separate attempts to use this form of therapy.

NASH (T. A. M.) The Anchoa Settlement Scheme.—Reprinted from *Farm & Forest* 1941 Oct Vol. 2 No 2. pp. 78-82

This is an account of the origin and development of this rural settlement situated in a sleeping sickness area. The many details concerning the problems dealt with cannot be abstracted, but the paper should be in the hands of all medical men and others interested in this aspect of the prevention of sleeping sickness.

C H

MALBRANT (R.) *Gibier tsetse et trypanosomiases*. [Game, Tsetse Flies and Trypanosomiases.]—*Bull Serv Zootech. Epizoot. A.O.F. Dakar* 1940 Vol. 9 No. 3 pp. 187-202. [Summarized in *Rev Applied Entom Ser B* 1941 Oct. Vol. 29 Pt. 10 pp. 161-162.]

The destruction of game as a method of controlling trypanosomiasis in Africa is discussed, and it is concluded that far from exterminating tsetse flies, which would be maintained on birds, reptiles, rodents and other animals not classed as game such a course would force the flies to rely much more on man and domestic animals for food. Strong, Bequaert & Cleveland divide tsetse flies into three groups, typified by *Glossina palpalis* R. D. *G. tachinoides* Westw. and *G. morsitans* Westw. according to their relation with game and a table is drawn up from data obtained by them showing the results of various workers who demonstrated that mammalian blood usually composed less than 50 about 70 and over 90 per cent. of the blood in flies of these three species respectively. It is emphasized that the distribution of game and tsetse does not invariably correspond the correspondence in the case of the *morsitans* group may be due not solely to a preference of the flies for game, but also to the fact that they are favoured by the same conditions as the latter. This is proved by the fact that when certain species of game begin their annual migration the flies even *G. morsitans* only accompany them a short distance. Although the severe epizootics of rinderpest in South Africa that often exterminated herds of buffalo and antelope often coincided with the disappearance of *G. morsitans* many non-susceptible animals survived and the tsetse could not have died of hunger. Evidence that some other factor intervened is provided by the fact that the tsetse disappeared at the same time from regions where the game had not been seriously affected.

It is also suggested that the extermination of game would result in the adaptation to man of certain trypanosomes that at present are pathogenic to domestic animals only. The author considers that there is no proof that big game can be a reservoir of *Trypanosoma gambiense*, and that a study of the evolution of the foci of sleeping sickness caused by *T. rhodesiense* and the ease with which they can be stamped out in certain regions by the proper treatment of infected persons, without any change being made in the animal population, shows that game plays no part, or only an occasional one in the conservation and propagation of this trypanosome. Various species of game can be reservoirs of trypanosomes pathogenic to domestic animals, and a table incorporating the results of many workers is given to show that the proportion of game animals harbouring trypanosomes in a region infested with tsetse flies is often considerable. It is thought, nevertheless, that the destruction of big game to remove one of the principal reservoirs of animal trypanosomiasis would not have the desired effect, as domestic stock also plays an important part and often harbours latent infection.

HORSBY (H. E.) Immunization against Bovine Trypanosomiasis.—*Trans Roy Soc. Trop Med. & Hyg.* 1941 Nov. 29 Vol. 35 No. 3. pp. 165-176. With 2 figs. [13 refs.]

This paper supplies information regarding the later fate of the animals which SCHILLING had attempted to immunize against trypanosomiasis. Schilling's general contentions were (1) That young

animals (foals calves) in the first weeks of their life possess a considerable resistance against the African trypanosomes transmissible by tsetse flies (2) That this natural resistance can be enhanced to a full immunity against superinfections by the fly either by minimal infections or by preventive vaccine treatment. [This *Bulletin* 1936 Vol 33 p 664]

Schilling's conclusions are based on evidence of survival at the end of July 1936 of three of 12 control animals four of nine vaccinated cases and eight of 17 calves treated with minimal infective doses. Schilling believed that the survivors were immune in the same way that most large African game animals within tsetse-fly belts are immune that they could thus be maintained in the presence of tsetse and that their offspring would be very good subjects for immunization.

In view of these widely published high hopes the subsequent history of the little herd is of interest. At the end of 1936 the experimental calves had become two-year-old heifers and bulls. They numbered 16 and, according to Hornby's notes three of them were controls four had been vaccinated with dead *T. brucei* and *T. congolense* and nine had received minimal infective doses of *T. brucei* *T. congolense* and *T. vivax*. In the same herd there were five cows—the remnant of the mothers of the experimental animals—and three calves born recently. The herd was maintained at Masumbwe a village north of Tabora, in what was formerly a sleeping-sickness area of the Western Province of Tanganyika. Hornby inspected them on the 3rd December 1936 and his findings are given in a table. At this time Masumbwe was at its best. There was abundance of grazing, and there were few if any tsetse about. The general appearance of the animals was excellent. Hornby was however not satisfied that the animals had been exposed to continual infection. He therefore planned to move the herd to an area where he knew they would be exposed to such infection but before this was done misfortune fell upon the herd.

On June 10th 1937 Hornby received a telegram informing him that seven cattle had died and many others were sick. Blood smears from four of those which had died showed *T. congolense* and this parasite was also found in blood films from three of the remaining 17 animals. Shortly afterwards Molloy reported on the survivors. He said that eight were definitely off-colour and presented the characteristic appearance of fly-struck animals. He failed to find any tsetse. By September 1937 the herd had picked up again and Molloy found that only one animal was off-colour all the rest being in good condition. Still no tsetse were seen. Smears taken every month showed that most of the animals were in a state of premunition regarding one or more species of trypanosomes as usually two or three smears from animals which differed from month to month were positive for trypanosomes.

In July 1938 the herd was moved into unmistakable tsetse country and from this time onwards the animals appeared to go downhill, many of them dying of trypanosomiasis. The last occasion on which Hornby saw the herd was the 21st January 1941. Only six animals were still alive, and all were in poor condition—a typically badly fly-struck little herd. Of the animals vaccinated or otherwise treated by Schilling in 1934 only one was alive. There was also one control. The other four were later calves of some of the mothers of the originally treated cattle. As they were born in light fly country, they were all infected naturally before they were a year old, and subsequently they

were exposed to repeated superinfections. During their short lives there had been times when in spite of trypanosomes they had regained a measure of good health. Yet they could not retain this state of pre-munition. Hornby concludes that there is nothing about the whole experiment to furnish hope that we are in sight of any practical method of immunizing cattle against trypanosomiasis. W Y

WOOD (Sherwin F) New Localities for *Trypanosoma cruzi* Chagas in Southwestern United States.—*Amer J Hyg* 1941 July Vol. 34. No 1 Sect. C. pp 1-13 With 7 figs. [18 refs.]

The object of this investigation was to collect and examine cone-nose bugs and bats from Texas for the presence of *Trypanosoma cruzi*. During the summer of 1939 609 live *Triatoma* were obtained and 565 examined. 30 (5.3 per cent.) were found to be naturally infected with *T. cruzi*. These included two *Triatoma protracta*, 20 *T. protracta* *woodi*, two nymphs of *T. gerstaeckeri* and 6 *T. longipes*.

The author summarizes his observations as follows —

"1. Five new localities for the discovery of naturally infected *Triatoma* with *Trypanosoma cruzi* were found.

"2. Three localities for *Trypanosoma vespertilionis* in bats were discovered.

"3. Naturally infected *Triatoma longipes* and *T. protracta woodi* are reported for the first time.

"4. Experimental infection of *Triatoma acidum* and *T. rubicincta* is reported.

"5. Preliminary testing in *Mus musculus* and *Peromyscus californicus* (signs) of three new strains of *T. cruzi* showed evidences of greatest virulence for the Arizona (Congress) strain.

"6. Developmental stages of *Trypanosoma cruzi* were demonstrated for the first time in the Eaton Canyon (Calif.) strain.

"7. The first death of a white mouse due to infection with a strain (Eaton Canyon, Calif.) from the United States was reported.

"8. Intimate human relationships with infected *Triatoma* were found.

"9. Unilateral palpebral edema in man in infected areas of the United States should be viewed with suspicion as probable evidence of Chagas disease."

W Y

TORANZOS (Lazaro B) FIGUEROA (Manuel L) & BARBARA (Luis) Primer caso agudo de enfermedad de Chagas en el departamento de Mercedes, provincia de Corrientes. [First Record of Acute Chagas's Disease in Mercedes, Prov. Corrientes].—*Semana Med* 1941 July 17 Vol. 48 No. 29 pp 149-151 With 1 map, 1 fig & 1 chart.

The case occurred in a child of 5½ years and presented the usual features. The parents were asked to forward for examination bugs from the house. Two females, a nymph and a larva were sent on one occasion, and a little more than a month later a male and three females. All these proved to be uninfected. More were asked for 3 weeks later and a female, five males and a nymph were sent and three of these were passing in the defecta, metacyclic and crithidial forms of the trypanosome. H H S

TORREALBA (J F) Resumen de la práctica del xenodiagnóstico para la enfermedad de Chagas en Zaraza (Guárico Venezuela) [A Review of Xenodiagnostic Work with Chagas Disease in Zaraza, Venezuela.]—*Rev Med Vet Parasit* Caracas. 1940 Vol. 2. No. 1-2. pp 25-43 With 4 plates [38 refs.] [Summarized in *Rev Applied Entom* Ser B 1941 Nov Vol 29 Pt 11 p 172.]

Having observed that rural dwellings in the district of Zaraza, in the State of Guárico Venezuela, were infested with Triatomids infected with *Trypanosoma* (*Schizotrypanum*) *cruzi* the author has, since 1933 made 66 examinations for Chagas disease by the method of xenodiagnosis, obtaining 22 positive results. The bugs used were *Rhodnius prolixus* Stål, and in a few cases *Triatoma* (*Eutriatoma*) *maculata* Erichs. Records of the cases are given.

PIFANO (Félix) La enfermedad de Chagas en el Estado Yaracuy Venezuela. [Chagas's Disease in the State of Yaracuy, Venezuela.]—*Gac. Med de Caracas* 1941 Feb 15 & 28 Mar 15 & 31 & Apr 15 Vol. 48. Nos. 3 4 5 6 & 7 pp 201-206 209-216 220-227 232-236 244-246. [70 refs.]

The writer of this thesis was awarded the Vargas Prize for the period 1938-40. He has presented a fairly comprehensive account of the disease in Yaracuy. The subject is dealt with under 7 headings and ends with a list of 70 references. The author begins by giving a few clinical notes on 19 cases diagnosed by direct blood examination and on 40 whose blood was negative and on whom the xenodiagnostic test was made. 14 of them proved positive. Next he made a collection of the Triatomidae of the district and found 7 species namely *Rhodnius prolixus* *Eutriatoma maculata* *E. nigromaculata* *Psammolestes arthuri* *Panstrongylus geniculatus* *P. rufotuberculatus* *Eratyrus cuspidatus*. Of these the most important (as the source of the most virulent strain of the trypanosome or being the most heavily infected) was *Panstrongylus geniculatus*. A third section concerns the animals found naturally infected—armadillo opossum cat dog rat and others. Only a few of these were examined but all of 10 species were found infected. [In a table is given the percentage of each species infected. 50 per cent of 2 33 33 per cent of 3 each meaning of course one animal infected. This is very liable to mislead. In only two were more than ten examined, viz 18 *Canis familiaris* of which five were infected—stated as 31 25 per cent.—and 19 *Hemiderma perspicillatum* of which 38 per cent were positive—an impossible percentage but probably means 7 of the total.]

In section IV the author discusses very briefly the relations between human and animal infection on the one side and naturally infected Triatomidae on the other. Next follow a few paragraphs on cultivation of the trypanosome and on the strains isolated, and less than 30 lines on treatment. Bayer 7602 recommended by Professor Salvador Mazza was given and some of the clinical signs seemed to recede after the fifth dose (fever adenopathy splenomegaly and oedema). The heartening effect of this statement is somewhat marred by the following. But we observed like results in other patients studied by us who did not receive any treatment.

After a short epitome of the previous sections the author ends with a bibliography with references from Carlos Chagas's original work in 1909 to some of his own in 1940

H H S

GASIC (Gabriel) & BERTIN (Victor) *Epidemiología de la enfermedad de Chagas en Chile* [Epidemiology of Chagas's Disease in Chile.]—*Rev Chilena de Hig y Med Preventiva*. 1940 June. Vol. 3. No 1 pp. 5-30 With 2 plates. [171 refs]

The first part of this article treats of Chagas's disease on general lines—the trypanosome, its vector animal reservoir hosts wild and domesticated. The latter part deals with the distribution of the disease in Chile, the ages of those attacked (half were between 6 and 10 years) the seasonal prevalence (more than half in the first half of the year) and serological diagnosis.

The transmitting Triatomidae are widespread in the northern and central parts of Chile—how far they extend to the south has not yet been determined. Of more than 7,000 specimens of *Triatoma infestans* examined, round about 40 per cent., mainly in the provinces of Atacama, Coquimbo, Santiago and Aconcagua, have been found infected. Dogs and cats have been found naturally infected. The Machado Guerreiro reaction has proved very reliable—among 416 persons in the small district of Doneyko 32.4 per cent. gave clear positive reactions.

H H S

NEGHEME (Amador) & FAIGUEKRAUM (Jacobo) *Observaciones preliminares sobre enfermedad de Chagas, en la parte alta del valle del Río Aconcagua* [Chagas's Disease in the Upper Parts of the Aconcagua Valley]—*Rev Chilena de Hig y Med Preventiva* 1940 June Vol 3 No 1 pp 57-59

This is little more than a preliminary note. On the right bank of the valley runs the Chile-Argentine railway and there are many scattered dwellings inhabited mostly by railway employees, along the route. The authors have examined so far 303 *Triatoma* specimens in various stages of development and found 89 or 29.3 per cent. infected by *T. cruzi*. 55 were in the imago stage 33 nymphs and 1 larva. Children are seen showing Romana's sign—unilateral palpebral oedema. Further study is to be undertaken.

H H S

SINJOVICH (Isaac) & SOMADINI (Antonio F.) *Un caso de enfermedad de Chagas en Clodomira* (Pcia de Santiago del Estero.) [A Case of Chagas's Disease in Clodomira, Santiago del Estero.]—*El Día Médico* Buenos Aires 1941 July 7 Vol. 13 No 27 pp 626-627 With 3 figs

A typical case in a boy 4½ years old, proved by finding of the trypanosome in a thick drop preparation and cured by paroxyl (0.02 gm. per kilo. body weight) and dicalose and arrenal 0.1 gm. daily. At the end of a week after he came under the authors' observation the oedema of the eye had disappeared, neither liver nor spleen was palpable and the general state was good. The child was discharged from hospital 11 days after admission and "subsequent examinations at the laboratory have revealed no abnormality."

H H S

REY MATIZ (Hernando) Observaciones sobre trypanosomas en Colombia. [Trypanosomes of Colombia.]—*Rev Facultad de Med Bogotá*. 1941 July Vol. 10 No 1 pp 25-49 With 20 figs. [25 refs]

ROSENFELD (Gastão) & CARDOSO (Francisco A) Distribuição dos triatomídeos e da moléstia de Chagas no estado de São Paulo (Brasil) [Triatomidae and Chagas's Disease in São Paulo]—Reprinted from *Rev Clin de S Paulo* 1941 Vol 9 No 6 pp 198-209 With 2 maps [31 refs] English summary

After a brief review of the literature regarding the presence of Chagas's disease in S Paulo, the authors give a list of the vectors found infected in nature together with a map of the State showing by difference of shading the municipalities or counties (1) where no Triatomidae were seen (2) where they were found but not infected, and (3) where infected bugs were present. The species identified were *T infestans* *T rubrofasciata* *Eutritoma oreoaloi* *E sordida* *E tibiamaculata* *Parstrongylus megistus* *P geniculatus* and *Rhodnius domesticus*. The first was the commonest.

On a second line-map are indicated the municipalities with the distribution of Triatomidae of human cases of the disease and of the animals found infected in nature. Two hundred and seventy municipalities were investigated and in 92 of them Triatomidae were found. In 41 these insects were proved to be infected by *T cruzi*. Distributed among seven municipalities 11 human cases were found and in two there were found three domestic dogs infected. H H S

MAZZOTTI (L.) Experimental Infection of *Haematosiphon inodora* Dugès with *Trypanosoma cruzi* Chagas.—*Bull Brooklyn Ent Soc Lancaster Pa.* 1941 Vol 36 No 2 pp 67-68 [Summarized in *Rev Applied Entom Ser B* 1941 Dec Vol. 29 Pt. 12. p 191]

On 20th June 1940 15 adults of *Haematosiphon inodora* Dugès a Cimicid that infests poultry yards in Mexico and the United States and attacks man as well as fowls especially when the yards are near bed-rooms were placed on a mouse lightly infected with *Trypanosoma cruzi*. 12 of them fed in about 20 minutes and 4 defaecated less than 5 minutes after feeding. One of the bugs was killed on 5th July and metacyclic forms of *T cruzi* were numerous in its intestinal contents. Saline suspensions of the intestinal contents of two of the infected bugs were inoculated intraperitoneally into two mice on 11th July and both the mice became infected the incubation periods being 11 and 15 days.

PIFANO (Felix) Parasitismo natural de *Amblyomma Longirostre* Koch 1844 por *Schizotrypanum cruzi* Chagas 1909 [*Amblyomma longirostre* Infected in Nature by *T cruzi*]—*Gac Méd de Caracas* 1941 May 31 Vol 48. No 10 pp. 288-289

The author in the course of an examination of the ectoparasites of Cercolabidae in the State of Yaracuy Venezuela found *Amblyomma longirostre* a parasite of the porcupine naturally infected with *T cruzi*. In the larval and nymph stages it is commonly found in birds but the adults are more usually seen on tree-dwelling animals and especially the Cercolabidae (arboreal porcupine) H H S

CARDOSA (F. A.) & NAVAJAS (E.) Achado de dois cães naturalmente infectados pelo *Trypanosoma cruzi* Chagas, 1909 no município de Itaporanga, Estado de São Paulo. Presença na mesma localidade de *Triatoma infestans* (Klug 1834) infectado pelo *T. cruzi*. [Two Dogs Infected with *T. cruzi*. Infected *T. infestans* in the State of São Paulo.]—Reprinted from *Rev Clin de S Paulo* 1941 Vol. 9 No. 6 pp. 176-187. With 14 figs. [11 refs.] English summary.

The authors give the results of a survey on Chagas disease which was carried on in the Nucleo Colonial Barão de Antonina, municipality of Itaporanga State of S. Paulo Brazil. They captured 540 triatomids belonging to *Triatoma infestans* (Klug 1834) which were examined and found infected with *Trypanosoma cruzi* Chagas 1909 in a high percentage (45.3 per cent.) They also found two dogs naturally infected by *T. cruzi* and based diagnosis on thick blood drop examinations. Search for human cases was negative.

TORREALBA (J. F.) & RICCARDI (Blas) Más notas clínicas y epidemiológicas acerca de la enfermedad de Chagas. [Chagas's Disease. Clinical and Epidemiological Notes.]—*Gac Med de Caracas* 1941 Mar. 31 & Apr. 15 Vol. 48 Nos. 6 & 7 pp. 238-241, 246-248. With 8 figs.

The authors record four cases briefly: a female child of 11 months, a girl of 16 years and two adult women. All four presented Romana's sign with dacryo-adenitis and the trypanosome was found in a thick drop of blood in each case. The patients came from Palo Seco and Tablerito, suburbs of Zaraza. Eleven of the inhabitants were tested by xenodiagnosis and two proved positive. *Paratrypanus geniculatus* was found in the nests of the armadillos, and of two adults three larvae and two nymphs of *P. geniculatus* all were infected with *T. cruzi*. Dogs (15), pigs (3) and cats (4) were examined by thick blood drop or the xenodiagnostic method, and one cat proved positive by the latter; all the rest were negative. Other reservoir hosts were found to be armadillos, grey rats and wild guinea-pigs (acure).

H. H. S.

MAZZA (Salvador) & SALICA (Pedro R.) Investigaciones sobre enfermedad de Chagas. Acerca de *Chagomas hematogénos* en un caso simulando abscesos múltiples y en otro chagoma de inoculación. [Studies in Chagas's Disease. Haematogenous Chagomata.]—*Universidad Buenos Aires. Misión de Estudios de Patología Regional Argentina (Unjuvy)*. Publicación No. 64. 1941. 21 pp. With 18 figs.

The authors divide chagomata into three types: (1) Chagoma of inoculation is a swelling at the site of primary inoculation. (2) Metastatic chagomata, satellites of the primary chagoma. (3) Haematogenous chagomata, multiple and probably blood-borne appearing at a distance from the primary chagoma. A subvariety of the last—a swelling with deep cellulitis appearing on the face—are designated *Lipochagomas geniales* or lipochagoma of the cheek.

They describe two cases, in one of which, in a child of two months, several chagomata appeared on the trunk and were opened and discharged purulent matter (but the blood picture showed a lymphocytosis).

of 50 to 64 per cent. and polymorphonuclears 38 to 18 per cent. only) The second patient was a girl of two years and four months with a swelling "the size of an orange" over the left side of the face and angle of the lower jaw

The histology of the condition is well depicted in photomicrographs. Briefly it is characterized by marked inflammation of the skin and cyto-steatonecrosis of the subcutaneous tissues. In the histiocytes leishmanial forms of *T. cruzi* are demonstrable. H H S

MAZZA (Salvador) BASSO (Germinal) & BASSO (Redento) Investigaciones sobre enfermedad de Chagas. Comprobación por biopsia de la naturaleza chagásica de la esquizotripanide eritematosa polimorfa. [Chagas's Disease Histological Proof of the Trypanosomal Nature of the Erythematous Eruption in this Disease]—*Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina (Jujuy) Publicación No 56 1941 29 pp With 27 figs.*

A man of 36 years, living in Mendoza developed Chagas's disease with a primary chagoma of the neck and on the 10th day an erythematous eruption on trunk and limbs, the so-called roseola or polymorphic erythema of this disease. On the 17th day of disease the eighth of the rash, a specimen of a prominent site of the rash was taken for biopsy examination and leishmanial forms of the trypanosome were demonstrated. Photographs are reproduced showing the rash and its distribution the primary chagoma and the histology of the cutaneous lesions. H H S

CACERES (Romeo) Acerca del signo del ojo o signo de la M.E.P.R.A. en la enfermedad de Chagas. [The Eye Sign or the M.E.P.R.A. Sign in Chagas's Disease.]—*Revista Méd Argentina 1941 Sept. 10 Vol. 28. No 37 7 pp With 1 fig*

This is usually known as Román's sign the initials indicate the Misión de Estudios de Patología Regional Argentina C IV

MAZZA (Salvador) Tratamiento de la enfermedad de Chagas. [Treatment of Chagas's Disease.]—*Revista Méd Argentina 1941 July 30. Vol. 28. No 31 7 pp*

CHAGAS (Carlos) Tripanosomiasis americana. Versión castellana, introducción y notas de Memorias do Instituto Oswaldo Cruz Tomo VIII, Fascículo II año 1916 por Salvador Mazza. [American Trypanosomiasis.]—*Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy Publicación No 55 1941 45 pp With 16 figs.*

MALARIA.

ALEXANDROV (1 M.) *Malaria in the Mountains.—Soviet Med.* 1940
No 2 pp 19-20

This contribution is based on the experience of the author in the Pamirs in regions at an altitude of not less than 2,000 m. It has been observed that malarial subjects, be the infection active or latent, generally develop an acute paroxysm or exacerbation on journeying from low levels into the mountains. The quicker and greater the change of altitude the greater is the tendency to and severity of the attack. A journey by air at 4,000 m is more likely to precipitate a paroxysm than a car journey. Though the disease is either activated or exacerbated, high altitudes have a favourable influence on the disease often it is seen to terminate with the precipitated paroxysm or to undergo favourable changes in the symptoms the enlarged spleen shrinks to its normal size.

The mode of action of the various factors concerned is not sufficiently studied and understood. Heightened ultra violet radiation oxygen hunger rapidly and height of ascent, fatigue of the journey all have a share in precipitating the paroxysm of malaria. Quartz radiation is known to provoke an attack and is used as a diagnostic test for latent disease. The author attributes the beneficial effect of altitude on the patient to the marked stimulation of vitamin D formation, activation of bone-marrow and haemopoiesis.

The precipitation of the attack is accounted for by the plasmodia thrown into the circulation from the blood squeezed out of the shrinking spleen. The lowered atmospheric pressure explains the epistaxis and copious menses seen in some patients. The water of mountain springs being rich in salts, sometimes upsets the digestive tract and brings about a relapse of malaria.

The author has often encountered tertian malaria in the Pamirs even in winter. Anopheles are found at altitudes of 2,000 m.

The author's findings are based on some 200 cases among copper miners and alpinists in this region. Among diseases calling for differential diagnosis he includes typhoid, central pneumonia, miliary tuberculosis, meningitis, typhoidal miasma [sic] typhus, visceral leishmaniasis, syphilitic fever and brucellosis. He draws special attention to relapsing fever due to *Spirochaeta carteri* which is most confused with malaria in this region. The spirochaetal fever is self-limited, ends in immunity of the patient, and is said to have no specific remedy. In some cases both infections may be present. The author states that blood tests cannot be relied on for diagnosis, as they vary with the altitude but considers that Henry's reaction is of reliable diagnostic value.

To combat malaria in the Pamirs the author advocates compulsory prophylactic treatment with acetoquinine [atebrin] in all cases of less than three years freedom from attacks. In active cases, owing to the probability of concurrent infection with both malaria and *Spirochaeta carteri* simultaneous treatment with Orisol and plasmoicide is recommended. Cardiazol and barbiturates have been valuable in ameliorating the patient's condition.

D V. Gini

- TANAKA (Shigeo) Untersuchungen der hygienischen Gegenstände in der Yulin-Gegend auf der Insel Hainan. [Health Conditions in the Yulin District of Hainan.]—*Taiwan Igakkaï Zasshi* [Jl Med Assoc Formosa] 1941 July Vol. 40 No 7 [In Japanese pp 1181-1208 With 4 figs on 1 plate [53 refs] German summary pp 1208-1211]

Malaria is endemic in the Yulin district of Hainan but the inhabitants are cut off from treatment and preventive measures are unknown. It is an area of streams from the foothills and through it flows the sluggish river Taginsu whose banks are thickly wooded. The mean temperature is from 24.5°C to 28.6°C and the relative humidity over 50 there is a heavy rainy season. The Anopheles found were *A. hyrcanus* var. *sinensis* (132 specimens) *A. jeyporensis* var. *candidiensis* (101) *A. maculatus* (23) and *A. annularis* (78). [No mention is made as to infection in these species or as to their breeding places.] Malaria parasites were found in 6.1 per cent of the persons examined. *P. vivax* and *P. falciparum* about equally. Enlarged spleens were found in 34.3 per cent of the total examined, but in 64.2 to 75 per cent of children under 15. In general there was slight anaemia with a colour index of 0.93. The remainder of the paper deals with various blood examinations in which nothing new is recorded.

C IV

- VISWANATHAN (D. K.) The Utility of Malaria Parasite Indices in Infants in the Study of Malaria.—*Jl Malaria Inst of India* 1941 June. Vol. 4 No 1 pp 139-152. With 2 graphs. [10 refs.]

This is a study based on the results of the examination of the blood of 1 697 infants under one year of age living on tea estates in Upper Assam where *A. minimus* is the vector. Of this total 393 were found to be infected 23.2 per cent as compared with a parasite rate of 46 per cent. in children from 2 to 10 years of age. The infection rate for infants increased with age 6.0 per cent. below two months 14.9 per cent from two to four months 32.4 from four to six months 47.9 per cent six months or over. The age and seasonal distribution of the positive findings indicated that there is a prolonged period of transmission from May to January inclusive and that relapses are most prevalent in April that *P. vivax* transmission commences in May and that *P. vivax* infections are most prevalent from May to July that *P. falciparum* infections are more prevalent than *P. vivax* infections throughout the year and are most prevalent in the last quarter of the year and that infants under two months of age seem to possess some degree of inherited immunity. The author considers that infants of the age-group more than two but less than four months furnish the best evidence of the quantum of seasonal infection.

Norman White

- RAMON (T. K.) *Plasmodium ovale* in India.—*Jl Indian Med Assoc* 1940 Sept Vol. 9 No 12. pp 583-585 With 6 figs

The author writes to say that several protozoologists in India have seen slides from the patient and have confirmed his opinion that the parasite was typical *P. ovale* [see this *Bulletin* 1941 Vol. 33 p 290].—Ed

MARKS (M. B.) *Accidentally Transmitted Malaria.*—*Arch. Pediatrics.* 1941 June Vol. 58. No 6. pp 357-364 [18 refs.]

A two-months-old infant developed an attack of quartan malaria in hospital at Miami, Florida, after receiving three intramuscular injections of whole blood. The donors of the blood were the father of the infant and a laboratory technician. Neither the father nor the technician had any history of malaria nor did an examination of their blood give any evidence of malaria infection. The mother also denied having suffered from malaria. The author considers it most improbable that the infant could have been infected in the usual way. Though the evidence is very inconclusive the author considers it probable that the blood transfusions were responsible for the infection. He considers it wise to exclude all donors who have ever had malaria or who come from malarial regions. If this be impossible he recommends that the recipient should be given a course of atebem as a prophylactic measure [For the use of quinine for this purpose see this *Bulletin* 1941 Vol. 38 p. 505.] N W

GORDON (Ernest F.) *Accidental Transmission of Malaria through Administration of Stored Blood.*—*Jl Amer Med Assoc* 1941 Mar 22. Vol 118 No 12. pp 1200-1202. With 1 chart.

There are some 35 instances on record in which malaria has been transmitted by the transfusion of fresh blood, but the case reported here is the first in which malaria has been found to have been accidentally transmitted by a transfusion of stored blood.

The patient, a boy aged seven, received three transfusions of stored blood for the relief of anaemia secondary to sepsis. Forty-four days after the first transfusion and 33 days after the last, he developed recurrent attacks of fever. After a further two to three months he was re-admitted to hospital. A tentative diagnosis of malaria was confirmed by the finding of numerous quartan malaria schizonts in a stained thick blood smear. The patient was treated with atebem and made a good recovery.

Since the boy resided in a district where malaria is almost unknown it seemed likely that one of the blood transfusions might have been responsible. Two donors were concerned whereas one had lived in a district free from malaria, the other had lived in Italy for the first 15 years of his life and had also been in France during the first World War. The blood of both donors was examined after both had received an injection of adrenalin. A few malaria parasites were found in the blood of the Italian-born donor. The blood of this donor had been stored for only two days before being used for transfusion.

Previous experimental work suggests that malaria can be transmitted *via* stored blood when the blood has been stored for less than five to eight days. The author suggests that the accidental transmission of malaria by transfusion could be avoided either by only using blood stored for more than eight days, or by examining a thick smear of the blood of all prospective donors, or by refusing to accept as donors any individuals who have ever resided in a district where malaria is endemic.

[The possibility that the Italian-born donor might have been re-infected whilst resident in the U.S.A. is not discussed. Blood taken

from individuals who have previously lived in malarial districts may safely be used for the production of serum and plasma.]

P. L. Mollison

RAEVSKII [The Microclimate of the Winter Quarters and the Behaviour of the Hibernating Females of *Anopheles maculipennis* var *messae* Flin.]—*Vopr. Fiziol. Ekol. malar. Komara* Moscow 1940 Vol 1 pp. 135-151 With 3 figs. [Summarized in *Rev. Applied Entom.* Ser. B 1941 Dec. Vol. 29 Pt. 12 p. 202.]

From December 1934 to February 1935 the author studied the variations in the microclimate of an experimental winter shelter for *Anopheles maculipennis* var *messae* Flin. and the behaviour of the females hibernating in it. The temperature in the shelter varied by 4-5°C [72-9°F] at various points it was higher at the walls than the average for the shelter as a whole during the first half of the period and lower during the second. The overwintering females showed the same marked negative geotaxis as summer individuals. Relative humidity which was above 60 per cent. did not influence the distribution of the mosquitos in the shelter. In the presence of fairly uniform temperature and humidity light was the main factor the mosquitos preferring the darkest places. In a relatively warm environment, they were in continuous slow movement. The behaviour of the overwintering mosquitos is classified as typical of summer semi hibernation and hibernation the degree of complexity of the reaction to stimuli varied directly with environmental temperature. In relatively warm surroundings the fat body was rapidly exhausted, giving rise to weakness and consequent variation in the reaction to stimuli. Hibernation did not interrupt the tendency of some individuals to leave the shelter. As in summer flight occurred at sunset and was probably due to hunger caused by premature exhaustion of the fat-body. The number of weakened individuals increased towards spring, and they came down from the ceiling and upper part of the walls and died.

HATES (Marston) Field Studies of the Anopheline Mosquitoes of Albania.—Reprinted from *Proc. Entom. Soc. Washington* 1941 Mar. Vol. 43. No. 3 pp. 37-58. With 7 figs. (6 on 3 plates) [16 refs.]

BLACKLOCK (D. B.) & WILSON (Carmichael) Notes on *Anopheles gambiae* and *A. gambiae* var *melas* in Freetown and its Vicinity.—*Ann. Trop. Med. & Parasit.* 1941 Oct. 21 Vol. 35 No. 1 pp. 37-42.

This note is of some importance to Freetown. The authors confirm the suggestion made by Ross that engorged female anophelines may rest during the daytime in shrubs. Adult female *A. gambiae* were found in hedges (of a species of angelica) and young oil palms and the finding of these led to the discovery of a breeding place in human footprints on a newly constructed slipway down to the beach. Seepage water had filled these small hollows and they were crowded with larvae. Oiling of the breeding place and spraying of the hedges eliminated the mosquitoes.

A. gambiae var *melas* was found also of 30 dissected, two had microfilariae one sporozoites in the glands and one both microfilariae and sporozoites.

C. W.

VENHUIS (W. G.) De vindplaatsen van geïnfecteerde *Anopheles maculatus* tijdens een epidemie in Oost Java. [The Haunts of Infected *A. maculatus* during an Outbreak of Malaria.]—*Geneesk Tijdschr. v. Nederl. Indië*. 1941 Oct. 14 Vol. 81 No. 41 pp. 2178-2188. With 2 figs. on 1 plate. [10 refs.] English summary.

During an epidemic of malaria at Kediri in East Java the author dissected 393 specimens of *A. maculatus* caught in houses, but found no stomach infections and only one sporozoite infection. This result was so poor that he conceived the idea that infected mosquitoes tended to leave the houses, and a second series of catches was made in the steep shadowy and moist banks of the smaller streams. Here of 124 guts examined one was positive and of 136 specimens 2 showed sporozoites. By this time the epidemic was almost at an end, and it is thought that if such a search had been made earlier a larger number of infections would have been disclosed. Only about one-third of *A. maculatus* caught in houses contained blood, whereas practically all the females on the stream banks were engorged. It may be that the mosquitoes in the houses were largely young adults waiting for a blood meal, or that there are two biologically distinct varieties—no morphological differences were found in adults, larvae or pupae to support the latter theory.

C. IV

WHITE (R. SENIOR) Observations on the Adult Habits of *Anopheles fluviatilis* and *Anopheles cervinus*.—*Jl. Malaria Inst. of India*. 1941 June. Vol. 4 No. 1 pp. 57-62.

This work was carried out in the Satpura Mills, Central Provinces and at Vizagapatam Madras.

PATERNO (P.) Il midollo osseo nelle splenomegalie da malaria cronica o progressiva. [Bone Marrow in Malarial Splenomegaly].—*Stomatologica Medica*. 1940. Apr. 21 No. 16 pp. 346-351. With 1 fig.

FIELD (J. W.) A New Rapid Method of staining Malarial Parasites in Thick Blood Films.—*Bull. Inst. Med. Res. Federated Malay States*. 1941 No. 2. 16 pp. With 19 figs. on 4 plates. [15 refs.]

The author has already described in earlier publications (this *Bulletin* 1940 Vol. 37 pp. 808 and 874) methods he has found useful as aids to the rapid staining and identification of malarial parasites in thick films. In this paper certain details and figures which did not appear before are given. It is perhaps noteworthy that the time of exposure of films to the stain has been lengthened to a slight extent but nevertheless, the whole of the staining process, illustrated by a series of drawings, occupies less than ten seconds. The drying of the thick film in the first place is given as five minutes and presumably a similar period is required for the stained film to dry as it stands in the vertical position before it is fit to examine. One section of the paper is devoted to the differential diagnosis of malarial parasites in thick films and three plates of micro-photographs illustrate the points emphasized. In an appendix an alternative method for preparation of the stain is described.

C. M. Wenyaw

VAILLANT (C. M.) Report on a Group of Cases of Benign Tertian Malaria which in the Early Stages simulated German Measles.—*Jl Roy Army Med Corps* 1941 Nov Vol 77 No 5 pp 259-260 [Summary appears also in *Bulletin of Hygiene*]

A convoy of 20 patients from the same unit in the Sudan arrived in hospital, each man with a rash and fever. The diagnosis of German measles was made both at the unit and the hospital though no patient showed enlarged glands the rash was typical of that condition. The fever did not fall however and enlargement of the spleen was present in 6 so that blood examination was performed and in each case *P. vivax* was found. Later more similar cases arrived, making a total of 50. The fever and the rash disappeared under treatment with quinine.

It is beyond the limits of probability that all cases of German measles should have had malaria and *vice versa* but such a rash in malaria is almost unknown the opinion of two consultants was that these were cases of malaria with prickly heat brought on by the excessive sweating during the paroxysms but in view of the fact that the diagnosis of German measles was made and malaria not at first suspected, these cases are important. [They also provide an argument in favour of the routine examination of the blood in all fevers in malarious areas.] C IV

CHOPRA (R. N.) SEN (B.) & GUPTA (J. C.) Induced Malaria with Heavy Malignant Tertian Infection.—*Indian Med Gaz.* 1941 June. Vol. 78 No 6 pp 350-352.

The patient suffering from tabes dorsalis was inoculated with blood containing scanty *P. vivax* and *P. falciparum* but as no reaction occurred, he was given a second injection a month later. This produced an attack of subtertian malaria which is described and in which scanty rings only were seen for a week after that time the intensity suddenly developed to an infection of 30-40 per cent. of red cells. An intravenous injection of 7½ grains of quinine reduced this to 2 or 3 rings only per field and the infection was controlled in a few days by quinine given intramuscularly and by the mouth.

In India where benign tertian infection is so common Chopra has often used blood infected with *P. falciparum* in the treatment of neuro-syphilis but points out that careful daily observation and blood examination are essential. It is also noted that *P. falciparum* infection induced by blood injection is much more easily controlled than is infection transmitted by mosquitoes though not so easily as *P. vivax* inoculated in blood. A warning is given that in blood mixed infection is common and *P. falciparum* may suddenly flare up in the course of what appears to be a *P. vivax* infection C IV

KLIGLER (I. J.) & YOELI (M.) The Diagnostic and Epidemiological Significance of the Complement Fixation Test in Human Malaria.—*Amer Jl Trop Med* 1941 July Vol. 21 No 4 pp. 531-543 With 1 fig

For their complement fixation tests the authors used as antigen dried monkey blood infected with *P. knowlesi* that was given them by COGGESHALL [see this *Bulletin* 1939 Vol. 36 p 926] It was used in

[April, 1947]

a dilution of 1:160. An examination of sera from 300 human cases of malaria was made. As a rule the reaction became positive during the third week after the onset if the patients had had two or more attacks. Patients cured after one attack failed to give a positive reaction. In a few cases observed continuously the reaction disappeared during the fourth month after the last attack. In a hyper endemic area 88 per cent. of the children up to 12 years of age gave positive reactions regardless of the presence of parasites in the blood at the time of the test. Infected adults in this area also gave positive results. Only 10 per cent. of healthy adults in this area gave positive reactions.

A few tests were also made with an antigen prepared from *P. gallinaceum*. There is a cross reaction between the antigens of *P. knowlesi* and *P. gallinaceum* and sera from human cases of malaria that gave positive reactions with *P. knowlesi* antigen did so also with *P. gallinaceum* antigen.

D ALESSANDRO (G.) & SICARI (S.) Sull'essenza della reazione di Henry (Intrinsic Nature of Henry's Reaction).—*Rev. di Malariologia*. Ser. I. 1941 Jan.-Feb. Vol. 20 No. 1 pp. 1. German summary

The object of the research described in this paper was to determine whether Henry's reaction has any real immunological significance, or in other words whether the globulin of the serum of a malaria patient possesses any specific, or pseudospecific, affinity for melanin. The experiments recorded seem to supply an affirmative answer to this question: the authors believe that the reaction is more than a pure and simple physico-chemical reaction.

Recourse was had to the complement fixation technique. Tests were made with several substances. Globulin precipitated from serum with distilled water, euglobulin precipitated from serum with 1/250 HCl, the supernatant liquid of the euglobulin deposit neutralized with NaOH and whole serum, of both Henry positive and Henry negative sera. These were compared with regard to their power of deviating complement with a 1:20 dilution of melanin. The only difference noted between malaria and non-malaria sera was confined to the globulin fractions precipitated with distilled water: the globulin from malaria serum reacted with melanin, the globulin from malaria-free serum did not.

HENRY (A. F. V.) Hémoréolus artificiels (hémosémaline) et paludisme-lésion (Artificial Melanin and Flocculation in Malaria).—*Arch. Inst. Prophylactique* 1939 Vol. 11 No. 3 pp. 211-218.

DAUCKER (Kingsley E. D.) Intramuscular Quinine for Malaria. (Correspondence).—*Brit. Med. J.* 1941 Mar. 29 p. 494.

Experience in Bihar, India, has made the writer of this letter an advocate for the intramuscular injection of quinine in the treatment of malaria. The site for injection selected by him is the upper part of the middle third of the outer aspect of the thigh: here one can feel the needle pierce the fascia lata. The importance of timing the injections is stressed: the most effective time to give an injection is from one hour to half an hour before the temperature begins to rise. The

aim should be to get the maximum concentration of quinine in the blood when the merozoites are scattered in the blood stream. One timed injection of five grains of quinine is sufficient to cure the acute symptoms. By this form of medication a large amount of quinine might be saved and patients spared the unpleasant effects resulting from the heroic doses of quinine that are still sometimes given

N IV

CONDORELLI (Luigi) Porpora emorragica chimica da malaria. (Considerazioni patogenetiche sulla porpora da malaria.) (Quinine Purpura Haemorrhagica in Malaria Pathogenesis of Malarial Purpura.)—*Riv di Malarologia* Sez. I 1941 Jan-Feb Vol. 20 No 1 pp 8-29 With 5 charts. [15 refs.] English summary (5 lines)

A man aged 27 was serving in Abyssinia in 1935. For a time he was given prophylactic quinine daily and showed no sign of intolerance to the drug. In spite of the drug he fell ill with malaria. The attack was not severe but was accompanied by profuse epistaxis and a generalized petechial rash. He made a rapid recovery after treatment in which quinine had no part. In 1936 he was repatriated to Italy. He was in good health till November 1939 and then fell ill with malaria. It was a sharp attack. The temperature rose to 104°F and remained at this level for 48 hours. There were no haemorrhagic phenomena. After two days remission another febrile paroxysm occurred. He was given an injection of 1 gm of quinine. Half an hour later with intense shivering and a still further rise of temperature there were profuse epistaxis, bleeding from the gums, a diffuse petechial rash all over the body, intense subconjunctival haemorrhage in both eyes, intense haematuria and a large haematoma at the site of the injection. The symptoms and fever persisted and six days later the patient was admitted to hospital very dangerously ill. He eventually recovered. The author took full advantage of an interesting case and the results of the numerous haematological examinations made at the different stages of the patient's illness are set out at length. When the haemorrhagic symptoms and signs had cleared up an injection of 0.5 gm of quinine caused their return together with a rise of temperature. A month later a similar dose of quinine caused a slight rise of temperature but no haemorrhagic symptoms. Two and a half months later quinine caused a slight chill but no rise of temperature and no haemorrhagic symptoms. In this case it was clear that quinine and malaria conjointly were responsible for the haemorrhagic phenomena.

The author discusses at great length the pathogenesis of his case and the literature of both malarial and quinine haemorrhagic syndromes.

N IV

SIEGENBEEK VAN HEUKELOM (A) & WAHAB Thrombopenische purpura door idiosyncrasie voor kinine [Thrombopenic Purpura due to Quinine Idiosyncrasy]—*Geneesk Tijdschr v Nederl Indië* 1941 Apr 29 Vol. 81 No 17 pp 906-916. With 1 chart. [34 refs.] English summary

Description of thrombopenic purpura caused by chinin in a Chinese boy 17 years old. First attack at home after use of 1400 milligram (121)

within at least half a mile from them. This aim appears to have been successfully attained. Twenty-eight photographs and three maps make the description easy to follow. The report will be read with special interest by those who have some knowledge of conditions in and around Delhi before this work was put in hand. It is gratifying to learn that the Director of the Malaria Institute of India is a member of the recently formed committee which has the task of co-ordinating the activities of the various authorities concerned with the development of New Delhi and its surroundings.

N IV

CHOPRA (R. N.) ROY (D. N.) & GHOSH (S. M.) The Insecticidal and Larvicidal Action of the Essential Oils of *Ocimum basilicum* (Linn.) and *Ocimum sanctum* (Linn.).—*Jl Malaria Inst of India*. 1941 June. Vol 4 No. 1 pp 108-112

Ocimum grows wild throughout India, Burma and Ceylon. Parts of the plant are much used in India for the treatment of various diseases, notably bronchitis. The leaves are burnt on cow-dung to repel mosquitoes. Such beneficial properties as *Ocimum* possesses are generally ascribed to essential oils which different species contain in varying amount. The essential oils of *O. basilicum* and of two varieties of *O. sanctum* (holy basil) were investigated. Both possess some insecticidal action in the case of mosquitoes but such action cannot be compared with that of pyrethrum. The mosquito repellent action of the oil lasts for about two hours. Dried leaves burnt on cow-dung are no more deterrent to mosquitoes than cow-dung burnt alone. The oils of both species possess mosquito larvicidal properties but the high cost of production would prevent their use as larvicides.

N IV

ROSS (G. R.) & AYLEN (D.) Erosion and Malaria. Measures which Control Both Evils.—*Rhodesian Agric Jl* 1941 Vol 38. No. 4 pp. 173-191 With 9 plates. [Summarized in *Rev Appl Entom* Ser B 1941 Oct. Vol 29 Pt 10 p 164]

"The breeding places of *Anopheles gambiae* Giles, and *A. funestus* Giles, the vectors of malaria in Southern Rhodesia are briefly described and it is pointed out that, directly or indirectly a very large proportion of them are provided by erosion. In such cases, the best methods of controlling malaria are those designed to prevent the erosion. This paper deals principally with the types of erosion and ponding likely to occur within a radius of half a mile of dwellings, where the elimination of breeding places is most important. A comprehensive plan is given based on the requirements of a hypothetical farm presenting all the problems likely to be met with. It comprises the making of storm drains above the area, the replacement of any eroding drain by a grazed channel, the provision of drains round the house and in garden, stock yards and compound, road drainage, planting of bare areas and drains, making up the ground round water troughs and at gates, and protection work in minor gullies. The low cost of such measures as compared with that of temporary ones is emphasised. The nature of minor gully erosion, the design and lay-out of drains, the planting of couch grass on bare areas, the laying out of roads and their drainage, the treatment of small streams, the control of gully erosion and the treatment of banks of large gullies are dealt with in fair detail, and a list is given of trees that may be used to dry up moist soil.

HEWITT (Redginal) & KOTCHER (Emil) Observations on Household Anopheles in a Selected Group of Mosquito-Proofed and Non-Mosquito-Proofed Homes.—*Public Health Rep* 1941 May 16. Vol. 56 No 20 pp 1055-1061 With 1 fig

The observations were made in the Tennessee Valley in the summer of 1940 Houses both mosquito-proofed and non proofed, were searched for *A. quadrimaculatus* on three consecutive days of each week from June 1st to August 31st In June few were found in the houses and the differences between the proofed and non proofed houses were slight in July and especially in August more were found in the non proofed than in the proofed houses

Stained mosquitoes were released in the houses, but it was found that few could be recovered on the following day from either group of houses the presence of mosquito proofing therefore does not appear to reduce the number of mosquitoes able to leave the houses. There was little observed flight of stained mosquitoes between houses and barns.

C IV

WATSON (Robert Briggs) & MAHER (Helen C) An Evaluation of Mosquito-Proofing for Malaria Control based on One Year's Observations.—*Amer J Hyg* 1941 Sept Vol. 34 No 2. Sect. C pp 86-94 With 2 charts.

This is the first report of an attempt to demonstrate quantitatively the value of mosquito-proofing as an adjunct to other measures of malaria control. The studies were carried out close to Lake Wheeler in the Tennessee Valley which produces *A. quadrimaculatus* in large numbers The area is populated mostly by tenant farmers. Most of the houses were owned by non-resident landlords who decided whether or not they would allow their houses to be mosquito-proofed. The data presented concern 98 houses mosquito-proofed and 45 not so protected. The population concerned represents a fair sample of the tenant farmers of North Alabama, both negro and white.

All families in the area were visited in April before the beginning of the transmission season and blood films were made to estimate the prevalence of residual malaria. Blood films from the total population were also taken in August and in October Each house was visited once every 10 to 14 days throughout the season of transmission and information collected regarding the incidence of fever suggestive of malaria. Three measures of malaria prevalence were used a blood index a primary attack rate and a total morbidity rate The primary attack rate is the ratio of cases reported for the first time per 1 000 days of exposure The days of exposure were accumulated for each individual from May 15th to date of appearance of symptoms or to the end of period of observation September 30th. The total morbidity rate is the ratio of cases of malaria reported each month without regard to date of onset per 1 000 days of exposure

The blood surveys showed that the parasite indices of persons living in unscreened houses rose during the transmission season while those of persons living in screened houses remained constant The primary attack rate for persons in screened houses was 1.64 cases of malaria per 1 000 days of exposure for persons in unscreened houses, 3.10 The rapid increase of infections in June among white people was not experienced by negroes negroes possess a considerable relative tolerance for *P. vivax* infections. The peak incidence of malaria in the white

within at least half a mile from them. This aim appears to have been successfully attained. Twenty-eight photographs and three maps make the description easy to follow. The report will be read with special interest by those who have some knowledge of conditions in and around Delhi before this work was put in hand. It is gratifying to learn that the Director of the Malaria Institute of India is a member of the recently formed committee which has the task of co-ordinating the activities of the various authorities concerned with the development of New Delhi and its surroundings. N IV

CHOPRA (R. N.) ROY (D. N.) & GHOSH (S. M.) The Insecticidal and Larvicidal Action of the Essential Oils of *Ocimum basilicum* (Linn.) and *Ocimum sanctum* (Linn.).—*Jl Malaria Inst. of India.* 1941 June Vol. 4 No. 1 pp 109-112.

Ocimum grows wild throughout India, Burma and Ceylon. Parts of the plant are much used in India for the treatment of various diseases, notably bronchitis. The leaves are burnt on cow-dung to repel mosquitoes. Such beneficial properties as *Ocimum* possesses are generally ascribed to essential oils which different species contain in varying amount. The essential oils of *O. basilicum* and of two varieties of *O. sanctum* (holy basil) were investigated. Both possess some insecticidal action in the case of mosquitoes but such action cannot be compared with that of pyrethrum. The mosquito repellent action of the oil lasts for about two hours. Dried leaves burnt on cow-dung are no more deterrent to mosquitoes than cow-dung burnt alone. The oils of both species possess mosquito larvicidal properties but the high cost of production would prevent their use as larvicides. N IV

ROSS (G. R.) & ATLEY (D.) Erosion and Malaria. Measures which Control Both Evils.—*Rhodesian Agric Jl* 1941 Vol 38. No. 4 pp 173-191 With 9 plates. (Summarized in *Rev Applied Entom Ser B* 1941 Oct. Vol 29 Pt 10 p 164)

"The breeding places of *Anopheles gambiae* Giles, and *A. funestus* Giles, the vectors of malaria in Southern Rhodesia, are briefly described, and it is pointed out that, directly or indirectly a very large proportion of them are provided by erosion. In such cases, the best methods of controlling malaria are those designed to prevent the erosion. This paper deals principally with the types of erosion and ponding likely to occur within a radius of half a mile of dwellings, where the elimination of breeding places is most important. A comprehensive plan is given, based on the requirements of a hypothetical farm presenting all the problems likely to be met with. It comprises the making of storm drains above the area, the replacement of any eroding drain by a grassed channel, the provision of drains round the house and in garden drains, making up minor gullies. The low cost of such measures as protection work in minor gullies. The nature of the erosion compared with that of temporary ones is emphasized. The nature of minor gully erosion the design and lay-out of drains, the planting of couch grass on bare areas the laying out of roads and their drainage, the treatment of small streams, the control of gully erosion and the list is given of trees that may be used to dry up moist soil.

HEWITT (Redginal) & KOTCHER (Emil) Observations on Household Anophelism in a Selected Group of Mosquito-Proofed and Non-Mosquito-Proofed Homes.—*Public Health Rep* 1941 May 16 Vol 56 No 20 pp 1055-1061 With 1 fig

The observations were made in the Tennessee Valley in the summer of 1940 Houses both mosquito-proofed and non proofed were searched for *A. quadrimaculatus* on three consecutive days of each week from June 1st to August 31st. In June few were found in the houses and the differences between the proofed and non proofed houses were slight in July and especially in August more were found in the non proofed than in the proofed houses.

Stained mosquitoes were released in the houses but it was found that few could be recovered on the following day from either group of houses the presence of mosquito proofing therefore does not appear to reduce the number of mosquitoes able to leave the houses. There was little observed flight of stained mosquitoes between houses and barns C II

WATSON (Robert Briggs) & MAHER (Helen C) An Evaluation of Mosquito-Proofing for Malaria Control based on One Year's Observations.—*Amer J Hyg* 1941 Sept Vol 34 No 2. Sect C. pp 88-94 With 2 charts.

This is the first report of an attempt to demonstrate quantitatively the value of mosquito-proofing as an adjunct to other measures of malaria control. The studies were carried out close to Lake Wheeler in the Tennessee Valley which produces *A. quadrimaculatus* in large numbers. The area is populated mostly by tenant farmers. Most of the houses were owned by non-resident landlords who decided whether or not they would allow their houses to be mosquito-proofed. The data presented concern 98 houses mosquito-proofed and 45 not so protected. The population concerned represents a fair sample of the tenant farmers of North Alabama both negro and white.

All families in the area were visited in April before the beginning of the transmission season and blood films were made to estimate the prevalence of residual malaria. Blood films from the total population were also taken in August and in October. Each house was visited once every 10 to 14 days throughout the season of transmission and information collected regarding the incidence of fever suggestive of malaria. Three measures of malaria prevalence were used a blood index, a primary attack rate and a total morbidity rate. The primary attack rate is the ratio of cases reported for the first time per 1 000 days of exposure. The days of exposure were accumulated for each individual from May 15th to date of appearance of symptoms or to the end of period of observation September 30th. The total morbidity rate is the ratio of cases of malaria reported each month without regard to date of onset per 1 000 days of exposure.

The blood surveys showed that the parasite indices of persons living in unscreened houses rose during the transmission season while those of persons living in screened houses remained constant. The primary attack rate for persons in screened houses was 1.64 cases of malaria per 1 000 days of exposure for persons in unscreened houses 3.10. The rapid increase of infections in June among white people was not experienced by negroes negroes possess a considerable relative tolerance for *P. vivax* infections. The peak incidence of malaria in the white

group occurred in June in the negro group in August. It would appear that mosquito-proofing gave very considerable protection against malaria infection. N IV

HIKER (Cahm C) & BREEDLOVE (H. E.) Mosquito-Proofing for Malaria Control from the Standpoint of Construction Costs.—*Am J. Hyg.* 1941 Sept Vol 34 No 2. Sect C. pp 85-101 With 4 figs.

In areas bordering on Lake Wheeler in the Tennessee Valley 344 houses were mosquito-proofed at an average cost of \$33 per house. Many of the tenant farmer's homes are very dilapidated and mosquito-proofing was sometimes a complicated task. A description is given of the methods employed. The work is too recent to afford data of maintenance costs. N IV

DE NEGRI (Ugo) Rapporti fra alimentazione e malaria nel Delta del Po. Asili Refettori per bambini malarici [Relation between Malnutrition and Malaria in the Po Delta. Feeding Centres for Malarial Children.]—*Riv di Malariologia* Sez I 1941 Jan-Feb Vol 20 No 1 pp 30-50 With 4 figs 1 map & 1 chart. French summary (9 lines)

The author has made a study of the diet of the working agricultural population of the Rovigo province in the Delta of the Po and has brought to light the quantitative and qualitative insufficiency of that diet. Details are given of the diet of two representative families. Malaria is rife among these communities and one can readily accept the author's contention that dietetic insufficiency plays no small part in lowering resistance to malarial and other infections. The altogether insufficient quantity of milk available is specially detrimental to the children, mostly of preschool age, can pass the day and of the noteworthy change for the better in the health and general condition of the children benefited. Infected children receive appropriate treatment. [The Provincial Antimalaria Committee of Rovigo is to be congratulated on its initiative in one important aspect of malaria control that has been much neglected in many malaria districts of Southern Europe.] N IV

EJERCITO (Antonio) & CELIS (Espancion B) Another Design of Automatic Siphon Stiles in Malaria Control. (Design II.)—*Riv di Malariologia* Sez I 1941 Jan-Feb Vol 20 No 1 pp 51-65 With 10 text figs 1 sketch map & plan on 2 folding plates, & 16 figs on 4 plates

The automatic siphon is for a stream of considerable size. A cement culvert pipe 1 metre in diameter is placed end up on either side of a concrete dam built from bank to bank of the stream. The distal pipe is set 12 cm. lower than the proximal pipe. They are supported on blocks and fixed to the dam or retaining wall. A cement dome-shaped roof completely closes the upper ends of the pipes thus forming the siphon. The top of the dome is perforated to receive an iron pipe through which air passes from or into the siphon.

The report is very copiously illustrated with photographs and working drawings which are for the most part self-explanatory. It must be confessed that the letterpress does not add to their elucidation.

N IV

RAFFAELE (G) Ulteriori ricerche sulla fase monogonica primaria dei plasmodidi nell'uomo e negli uccelli [Further Researches on the Primary Monogonic Phase of Plasmodia in Man and in Birds].—*Riv di Malarologia* Sez. I 1940 Vol 19 No 4 pp 193-225 With 1 fig & 2 plates (1 coloured) [53 refs] English summary

The author discusses exoerythrocytic schizonts and states that it has now been definitely established that they originate from sporozoites or from merozoites formed from non pigmented schizonts within endothelial cells. It is claimed that merozoites formed within red blood corpuscles from pigmented schizonts are unable to give rise to exoerythrocytic schizonts. The fact that they may follow inoculation of blood containing the pigmented stages is due to unrecognized exoerythrocytic merozoites present in the blood inoculated. In a coloured plate is depicted a series of exoerythrocytic schizonts from cases of human malarial infection. One schizont is from the bone marrow of a case of *P. falciparum* infection and two from the bone marrow of a case of *P. malariae* infection. This is the first record of these forms in quartan malaria. A large part of the paper is devoted to a review of present knowledge of this phase of development of malarial parasites chiefly those of birds. In the text the author gives a diagrammatic representation of what he considers to be the life-history of a malarial parasite

C M IV

BRUG (S L) Exo-Erythrozytäre Malariparasiten beim Menschen [Exoerythrocytic Malaria Parasites in Man].—*Riv di Malarologia* Sez. I 1940 Vol 19 No 4 pp 226-229 With 1 plate & 1 chart

In lung smears made post mortem from a case of induced malaria in a paralytic the author noted certain appearances which he interpreted as due to exoerythrocytic schizonts within endothelial cells. In one cell was a round blue body with four chromatin masses. It was devoid of pigment and was regarded as a four-nucleated schizont. In two other cells were as many as forty small, red-staining patches or areas which are considered to be nuclei some of them in process of multiplication as there was a tendency to a paired arrangement. It is supposed that these represent schizonts on the way to merozoite production. In the cytoplasm of other cells are numerous rounded reddish bodies or granules which are described as Rickettsia like. The various cells are shown in a coloured plate but apart from the first form noted it seems doubtful if the interpretation placed upon them is correct. Even the first form, which is a body of definite structure might be interpreted differently

C M IV

BLACKWATER FEVER.

1937 (F W) Some Recent Researches on the Spleen and their Possible Relationship to Blackwater Fever—*East African Med J* 1941 Sept Vol. 18, No 8 pp 162-174 [30 refs.]

In this paper the author gives a brief summary of recent work on the spleen and blood, and then proceeds to discuss their possible bearing on the mechanism of blackwater fever. The circulation of the spleen has been the subject of much controversy. The splenic artery is noteworthy for its large calibre in proportion to its size while the splenic vein is one of the few veins devoid of valves. It has been calculated that the spleen contributes one-fifth of the total portal blood. The trabeculae of the capsule soon divide and the smaller arteries become surrounded by lymphoid tissue which swells out in places to form Malpighian corpuscles. There is some doubt how these arterioles terminate into the pulp while others run into the venous sinuses. Those ending in the venous sinuses (the penicilli) are furnished with peculiar structures (ellipsoids) which are supposed to act as potential valves and prevent backflow. The venous sinus is an unusual structure being surrounded with barrel-like hoops enclosing fenestrated staves. Arising from the venous sinuses are the venules and their walls have opening called stigmata.

MCNEE (1931) believes that the circulation of the blood in the spleen is two-fold (a) direct the blood flowing through the arterioles, the venous sinuses, the venules and then into the splenic vein (b) intermittent brought about by the contraction and enlargement of the spleen, which consists in emptying the pulp spaces through the stigmata in the walls of the venules and filling again through lateral channels in the walls of the ellipsoids. The blood can remain stationary in the pulp separated from the general circulation for considerable periods.

KINSLY (1934) has introduced a new conception of splenic circulation. He used a microscope on living exposed, trans-illuminated spleens of mice rats and cats and found that the sinuses and blood vessels were continuous, neither open nor blind ends being found in any blood vessel traced. The blood passes by long straight capillaries to the venous sinuses, its flow being controlled by sphincter-like segments of the arterial tree. The efferent end of the sinuses and blood tracts tightly and the sinus fills. The plasma filters out through the fenestrae in the walls leaving the red cells behind. This continues until the sinus is distended 20 to 50 times its normal size with tightly packed red cells. The plasma returns to the circulation through the stigmata in the walls of the venules, but the red cells remain packed in the sinus for periods varying from 10 minutes to several hours. Then the sinus suddenly opens and the packed red cells are discharged in masses. When the sinus has returned to its normal size blood is conducted as in an ordinary blood vessel for a period. Exercise, fright or adrenalin causes contraction of the spleen and emptying of the sinuses. If the animal is killed during the agonal period disappearances of the vessel walls can be seen during the agonal period with rapid diapedesis of the red cells into the pulp. There some phagocytosis of the cells takes place, thus producing the picture usually seen under the microscope which has led to so much misunderstanding.

Vint next turns to the question of the storage and destruction of red blood cells in the spleen. BARCROFT (1925) found that an increase of external temperature causes not only an increase in the amount of circulating blood but also an increase in the number of red cells and the amount of haemoglobin and he proved that the increase was accounted for by the release of red blood corpuscles stored in the spleen. In man the spleen is only 0.25 per cent of the body weight yet Barcroft found that the spleen may add 100 cc. of corpuscles to the circulation. It would appear that Barcroft's findings can be explained by Knisely's work on the anatomy of the spleen the contraction of the organ emptying the venous sinuses of packed red cells and the sinuses thereafter acting as normally conducting blood channels.

Recently some doubt has been cast on the theory that the spleen is responsible for the destruction of effete red blood cells. Various calculations suggest that in the neighbourhood of two billion red cells are destroyed every minute in the body. If these were being destroyed in the spleen by the endothelial cells it should be relatively easy to demonstrate erythrocytes in the endothelial cells. Vint has recently examined microscopically specimens from 105 spleens and in only two was he able to demonstrate phagocytosis satisfactorily.

Recently FAHRAEUS (1939) has made a number of interesting observations on the blood. If citrated or defibrinated blood is kept at body temperature it undergoes rouleaux formation and sediments. If this sedimented blood is shaken up the sedimentation rate is reduced, rouleaux formation is diminished and the erythrocytes tend to become globular in formation. Fahraeus has called these changes stabilization. Stabilization is probably due to some substance formed in the separated blood during warming and then adsorbed on to the surface of the red cell because if a specimen of stabilized blood is centrifuged and fresh cells added to the plasma the reconstituted blood behaves normally.

According to Knisely's conception of the splenic circulation, the blood in the sinuses is separated just as in Fahraeus's experiments. In both cases the blood is kept at body temperature and the reunion of the cells and plasma in the splenic vein corresponds to the shaking up of the blood in the test tube. Consequently the blood in the splenic vein should be stabilized. In point of fact various observations indicate that this is the case. HAMMARSTEN (1883) showed that the splenic blood cells were less flattened and showed less rouleaux formation than did arterial blood. This observation was confirmed by other workers and it was also noticed that the splenic blood had a slower sedimentation rate than arterial blood. Fahraeus concludes that prehaemolytic properties are given to the blood's main components by their separation in the spleen and that haemolysis takes place when they unite in the splenic vein and not in the spleen itself as is generally believed.

Turning to blackwater fever Vint points out that the disease is more frequent amongst Europeans than natives despite the fact that debility, bad food, dysentery and other infections are predisposing causes. It would appear that it is just these infections which prevent the onset of blackwater. Throughout the years these diseases have caused chronic enlargement of the spleen resulting in an overgrowth of fibrous tissue which actually destroys the reservoir and separator function of the organ and prevents congestive splenomegaly when an attack of malaria does occur. Vint found that the average weight of spleens from patients not dying of malaria was 19.8 ounces and in cases dying of malaria 13.5 ounces. In the native child fibrosis of the spleen

The only point noted was that the parasites appeared to be very resistant, both to quinine and atabrin, as the patient was still running a fever with a few parasites in his blood after 8 gm. of quinine and 1 gm. of atabrin.

The authors summarize their observations as follows —

From the transfusion of blackwater fever blood into a normal healthy adult with a previous history of malaria, it would appear that there are no specific parasites or haemolytic strains of malaria concerned in the genesis of blackwater fever since the recipient of haemolyzing blackwater fever blood failed to develop blackwater fever or any other sign of haemolysis, although he went down with malignant tertian malaria 11 days after he received the blackwater fever blood. The possibility of his having been infected from other sources was absolutely excluded.

The fact that the man failed to show any sign of haemolysis, although haemolysins were present in the blood he received, may have been due to the fact that he received insufficient blood or that he dealt with any haemolysin he received immediately.

" Blood cells transfused from three normal individuals into a haemolyzing case of blackwater fever underwent rapid haemolysis, showing that the red cells of normal individuals are just as susceptible to haemolysis when transfused into blackwater fever patients as are the blackwater patient's own cells. This fact seems to us to dispose of the view sometimes put forward that the red blood cells of blackwater fever patients are more susceptible to haemolysis than are normal cells, and makes it appear probable that a circulating haemolysin may be responsible for the trouble. Of course it is by no means improbable that continuous sensitization is necessary before the red cells become liable to haemolysis, or infection over long periods with a special strain of malaria, and that one infection is not sufficient to sensitize the individual.

Transfusion, even in moribund cases with red cell counts as low as 800 000 per c mm. is a life-saving measure, provided that renal function is being maintained.

W. Y.

FOY (Henry) & LEWIS (E. Gaynor) Blood Transfusion in Blackwater Fever and Haemolytic Anaemias following Sulphonamide Therapy — *South African Digest of War Medicine* 1941 Dec Vol. 1 No. 6 pp 137-143 With 2 charts

The authors consider that a certain amount of prejudice exists against blood transfusion in blackwater fever and in the haemolytic anaemias following sulphonamide therapy and that this prejudice is based on the belief that blood transfusion may aggravate the haemolytic process.

Two graphs are given the first showing the fluctuation in the haemolytic process (erythrocyte counts and urinary output of haemoglobin and methaemoglobin) in a patient with blackwater fever who was not transfused, and the second somewhat similar fluctuations in a patient who had four transfusions, each of 300 cc. of blood. The authors argue that " from these two cases, which are representative of many similar ones in Salomka, it is evident that the recurring haemolyses are not related to the transfusions but are a characteristic feature of blackwater fever their existence should not deter transfusions in all anaemic cases.

The indirect continuous drip method is recommended, as it permits of slow administration the giving of large doses if necessary and by combining intravenous glucose and saline, the giving of repeated transfusions without withdrawal of the needle from the vein. Stress is

laid on the necessity for proper grouping and compatibility tests. A blood level of 1.5 to 2.5 millions should be arrived at. 500 cc. of blood raises the erythrocyte count by 500 000 to 600 000 per cmm. A satisfactory rate of administration with doses up to 500 cc. is 40 to 60 drops per minute.

The question whether a patient with blackwater should be moved may have to be considered. In Salonika where the majority of cases have to be moved long distances over very bad roads and often in the most primitive conveyance the death rate is no higher than elsewhere (900 cases). Unnecessary movement should be avoided but if facilities for treatment at the clearing station are not available then the patient can and should be moved.

The question of fever sometimes arises in cases of blackwater and it will have to be decided whether this is due to malaria parasites or other causes (protein shock etc.) If due to parasites these should be dealt with by means of atebirin or quinine. It will frequently be found that a patient will run a fever for a day or two which subsides without any treatment if however fever persists and parasites are present they should be treated. There is little real evidence that quinine or atebirin given during an attack of blackwater is likely to cause a recurrence of the haemolysis except of course in cases of quinine sensitivity.

The authors next stress the importance of keeping up the fluid intake so as to diminish the danger of anuria. At least 2,000 cc. of fluids should be given daily during vomiting 1 000 cc. of saline or 5 per cent. glucose repeated every 12 hours should be given intramuscularly or intravenously. When vomiting has stopped sod bicarbonate 0.6 gm. (10 grams) should be given orally until the urine is alkaline to litmus.

The paper concludes with the recommendation that blood transfusions should be given to combat the anaemia which sometimes occurs as the result of sulphanilamide treatment. [In general the reviewer is in agreement with the rules laid down in this paper which as a matter of fact are commonly practised by those who have to deal with blackwater fever. There is however one important question upon which present knowledge (or ignorance) hardly warrants dogmatism: *viz* should quinine or atebirin be given during an attack of blackwater fever? The usual practice is to withhold these drugs until the patient has recovered from his blackwater and the urine has cleared. The present authors recommend that if fever persists and parasites are present antimalarial treatment should be given. As this advice may be followed by many who have little experience of the disease as it is contrary to general practice and as conceivably it may be wrong it is of interest to examine some of the authors' statements bearing upon it. What exactly do the authors mean when they write 'if however fever persists and parasites are present they should be treated'? *P. falciparum* is probably always present in the body of an individual suffering from blackwater but it is general knowledge that it is so scanty in the peripheral blood that it cannot be discovered except at the very commencement of the attack. Again fever is a constant sign in blackwater and is intimately bound up with the haemolytic paroxysms and not directly related to the presence of a malaria infection. What therefore does the authors' direction mean? Always give quinine or never give it?

Finally it is no doubt true that there is little real evidence that quinine or atebirin given during an attack of blackwater is likely to cause a recurrence of the haemolysis except of course in cases of

quinine sensitivity but there is equally little evidence that in certain cases quinine or atebirin given during an attack of blackwater may not aggravate the haemolytic process. The reviewer has frequently given quinine to blackwater fever patients, usually with no obvious effect but sometimes the drug has been followed by a violent haemolytic paroxysm. Whether the latter is a *propter* as well as a *post* phenomenon it is impossible to state just as it is impossible to forecast which case of malignant tertian malaria will develop an attack of blackwater when he is treated with quinine or atebirin.

On the whole it seems to the reviewer safer and better to withhold quinine and atebirin until the attack of blackwater is over. The malignant tertian infection in blackwater fever cases is so scanty that its treatment can well be delayed for a few days. The antimalarial drugs can hardly be expected to influence the haemolytic process favourably and it is possible that in some cases they may influence it in a very unfavourable direction. The plan followed by the reviewer is to withhold quinine during the attack of blackwater (except in the very rare instance when there is a double malaria infection and *P. vivax* is causing trouble) and then when the blackwater is over to give the patient one grain of quinine and gradually to increase the dose on successive days until full doses are reached. This is, of course, essential, as otherwise the attack of blackwater will probably be followed by a relapse of the malignant tertian malaria. } IV }

FAIRLEY (N. Hamilton). Methaemalbumin. Part I. Clinical Aspects.

—*Quarterly J Med* 1941 Apr. N.S. Vol. 10 No 38 pp. 95-

115. With 1 fig. & 1 plate. [29 refs.]

Most of the work mentioned in this paper has already appeared elsewhere and has been referred to in this *Bulletin*. The following are the summary and conclusions —

" (1) The spectroscopic appearances and chemical reactions of methaemalbumin in human plasma and when concentrated in the albumin fraction of blackwater fever serum are described.

" (2) Simple chemical methods used in conjunction with a direct vision spectroscope are described which serve to differentiate methaemalbumin from methaemoglobin and sulphaemoglobin.

" (3) Methaemoglobin has been universally described in the plasma of diseases associated with intravascular haemolysis and haemoglobinuria. This error has arisen through failure to differentiate spectroscopically between methaemoglobin and methaemalbumin.

" (4) As methaemoglobin and sulphaemoglobin are essentially confined within the corpuscle it is suggested that the term methaemoglobinocythaemia should replace that of methaemoglobinæmia, and sulphaemoglobinocythaemia that of sulphaemoglobinæmia.

" (5) Since it has been shown that haematin (ferri) in plasma immediately unites with the serum albumin to form methaemalbumin, Schumm's test in plasma is to be regarded as essentially a test indicating the presence of methaemalbumin, and not free haematin as has previously been supposed.

" (6) It follows that the condition previously described in medical literature as haematinæmia on the basis of this test should henceforth be called methaemalbuminaemia.

" (7) From a biochemical viewpoint the haemolytic anaemias fall naturally into three groups accordingly as they show (a) hyperbilirubinaemia alone, (b) hyperbilirubinaemia and methaemalbuminaemia, and (c) hyperbilirubinaemia, methaemalbuminaemia, and haemoglobinæmia.

(8) Regarding the site of haemolysis the available evidence suggests that hyperbilirubinaemia associated with a negative Schumm's test is indicative of intracellular blood destruction whereas methaemalbumin aemia implies lysis of corpuscles in the circulating blood

II

FAIRLEY (N Hamilton) *Methaemalbumin. Part II. Its Synthesis, Chemical Behaviour and Experimental Production in Man and Monkeys*—*Quarterly Jl Med* 1941 Apr N.S Vol. 10 No 38 pp 115-138 With 2 figs [20 refs.]

This paper also contains little that has not previously been published but as will be seen from the following lengthy summary the author brings his work on methaemalbumin up to date.

1 Methaemalbumin (pseudo-methaemoglobin) is immediately produced by the addition of alkaline haematin (ferric) prepared from pure haemin, to human and simian plasma at 37°C. but not to the plasma of other mammals.

2, Methaemalbumin is also formed when alkaline haematin (ferric) is added to the albumin fraction but not to the euglobulin and pseudo-globulin fractions of human and simian plasma

3 When alkaline haematin (ferric) is added to the individual proteins contained in the albumin fraction of human serum, crystalalbumin, seroglycoid, and globoglycoid, methaemalbumin is formed with crystalalbumin only

4 On the reversion spectroscopy synthesized methaemalbumin presents a three-banded spectrum composed of an α band situated at 623 μ to 624 μ , a β band at 540 μ to 541 μ , and a γ band at 500 μ to 501 μ , superimposed on a general absorption this is identical with the spectrum observed when methaemalbumin is concentrated in the albumin fraction of blackwater fever plasma.

5 The chemical reactions of synthesized methaemalbumin are identical with those observed with methaemalbumin found either in blackwater fever plasma or concentrated in its albumin fraction

6. On reduction with sodium hydrosulphite a compound haemalbumin with a two-banded spectrum is formed containing ferrous iron, further treatment with carbon monoxide leads to the formation of carboxy haemalbumin characterized by a spectrum very similar to that of carboxy haemoglobin.

7 Haemalbumin differs from haemoglobin in not combining loosely with oxygen this may be due either to an absence of polymerization or to its possessing a different protein component, albumin instead of globin

8 The effect of changes in pH on the wave length of the α band in various haematin mixtures was investigated

9 An enhanced stability in the presence of acid was demonstrated with human serum-haematin and human serum-albumin fraction haematin mixtures compared with colloidal haematin, recrystallized egg-albumin haematin, and the globulin fraction haematin mixtures.

10 A similar enhanced stability in the presence of alkali is known to occur these data indicate that human serum-albumin is not merely acting as a protective colloid keeping haematin in solution but is chemically combined with haematin.

11 When human albumin-haematin mixtures are examined in the ultra-centrifuge the pigment sediments at the same rate as serum-albumin, whereas in an egg albumin-haematin mixture it sediments in a heterogeneous manner like colloidal haematin These facts also indicate a firm union of albumin and haematin probably involving a chemical linkage

12. The conclusion reached from this study is that methaemalbumin is a definite chemical compound consisting of a prosthetic group oxidized haematin (ferric) and a protein component native serum-albumin

" 13. In rabbit serum-haematin mixture the spectrum resembles that of alkaline haematin, not methaemalbumin on the ultra-centrifuge however the pigment sediments at the same rate as serum-albumin so that here also an albumin-haematin compound is probably formed.

" 14. On injecting alkaline haematin (ferrie) intravenously in man in a dosage of 4 mg per kilo, methaemalbumin and not haematin was found in the plasma, which was brown coloured.

" 15. Methaemalbumin was concentrated in the albumin fraction of such sera, and was found to differ from alkaline haematin both spectroscopically and in its chemical behaviour.

" 16. In both the plasma and the albumin fraction of the serum the α band was situated at 623 μ , whereas with the original alkaline haematin it was at 616 μ . Other differences were also demonstrable.

" 17. On the addition of sodium hydrosulphate a double-banded spectrum with an α band at 5.2 μ and a β band at 5.31 μ was found, owing to the formation of haemalbumin. In the case of alkaline haematin a broad single banded spectrum is produced under similar conditions.

" 18. Other differences include the stability of methaemalbumin in the presence of alkalis and the formation of carbonylhaemalbumin after treatment with sodium hydrosulphate and carbon monoxide.

" 19. Similar findings are recorded with monkeys of the species *Cercopithecus mitis* and *Macacus rhesus* and *Macacus sinensis*.

" 20. In addition it was found that when reduced alkaline haematin (ferrous) was injected intravenously in these animals, methaemalbumin was formed, indicating that in the blood-stream reduced haematin (ferrous) was immediately oxidized to haematin (ferrie) which combined with serum-albumin to form methaemalbumin.

" 21. The bearing of these findings on the katabolism of circulating extra-corporal haemoglobin in intra-vascular haemolysis is discussed."

|| 1

Fox (Charles L.) Spectrophotometres of Fairley's New Blood Pigment, Methemalbumin.—*J Clin Investigation* 1941 Sept. Vol. 20 No 5 pp 603-608 With 3 figs

In the course of the study of acute haemolytic anaemia and haemoglobinuria during administration of sulphonamide drugs, the patients' sera were found to contain a pigment which, like methaemoglobin and sulphamoglobin, showed an absorption in the red region of the spectrum. The characteristic band of this pigment, around 7620 m μ and adjacent to that of methaemoglobin, was not altered by cyanide although that of methaemoglobin was obliterated. About the same time Fairley's papers appeared describing a new pigment which became known as methaemalbumin.

In the present work the author has determined the absorption coefficient of the new pigment. The work is of a somewhat technical nature and must be consulted in the original by those interested. The following are the conclusions—

" Fairley's new blood pigment methemalbumin was measured in the visible range with the recording spectrophotometer and preliminary value of its absorption coefficients were obtained.

" The characteristic absorption curve of this new pigment is compared with that of hemoglobin, methemoglobin, and sulfhemoglobin.

" The data obtained are utilized in measuring the formation of methemalbumin, *in vivo* and *in vitro*

|| 1

WEISE (W) Ueber Hämatinämie bei Malaria. [Haematinaemia in Malaria]—*Archivos do Inst Biol* Buenos Aires 1940 Vol. 11 pp 585-600 [24 refs.]

SCHUMM (1912) was the first to demonstrate the presence of haematin in human serum in pathological conditions. The spectrum of haematin is very similar to that of methaemoglobin but the addition of a little soda solution causes the band in the orange to disappear with methaemoglobin whereas the similar band of haematin persists. Haematinaemia has been found in a whole series of pathological conditions viz after certain poisons such as potassium chlorate dinitrobenzol etc. in certain haemolytic conditions such as pernicious anaemia paroxysmal haemoglobinuria and in certain other severe conditions such as acute yellow atrophy of the liver. SCHUMM and HEGLER also found haematinaemia in 6 of 11 cases of malaria and since then it has been frequently found in this disease.

The author considers the source of the haematinaemia in malaria. The pigment of the parasitized red cells consists wholly or in great part of haematin. HEILMEYER has reached the conclusion that the malaria pigment is a combination of haematin and a nitrogen containing substance. Apparently the malaria parasite breaks up the haemoglobin using the globulin constituent as nourishment and leaving the haematin behind as a combination with the nitrogenous substance. When schizogony occurs the pigment escapes into the blood plasma and is demonstrable there before it is taken up by the reticulo-endothelial cells. The breaking down of haemoglobin leads under physiological conditions to bilirubin. From the chemical standpoint the change from haematin to bilirubin is very plausible even though the conversion has not yet been accomplished *in vitro*.

Bilirubin is increased in the serum in malaria. It is iron free and the iron-containing fraction is separated off as haemosiderin. In malaria haemosiderin is found especially in the liver. Further as it has been shown that there is an increased stercobilin excretion in malaria it seems reasonable to assume that the conversion and excretion of the malaria pigment take place in the above manner. The correctness of this view however became doubtful when DUESBERG (1934) showed that injected haematin was not converted into bilirubin. Apparently then the biliary pigment must arise directly from haemoglobin and not through the intermediary of haematin. In conclusion it can be said that the malaria pigment consists of haematin which is conveyed by the circulation to the organs (liver and spleen) in which the destruction of the blood pigment normally occurs. It is probable that the gradual conversion of the pigment to the biliary pigment takes place while the iron is split off in the form of haemosiderin.

There is a belief amongst malarialogists that the number of erythrocytes which are destroyed during a malarial paroxysm is greater than those infected with parasites, and it is consequently assumed that the parasitized red cells contain a haemolysin which destroys a number of non parasitized cells. The author believes that the haemolysis which takes place in blackwater fever differs only in degree from that which occurs habitually in malaria. He remarks that in *Plasmodium knowlesi* infections of monkeys the haemolytic processes are so pronounced that haemoglobinuria is the rule. [It has always appeared to the reviewer that there is a fundamental difference between the genesis of the haemoglobinuria in blackwater fever of man and in that

which is frequently seen in *P. knowlesi* infection of monkey. In the former infection, the number of malaria parasites is comparatively small when the attack of blackwater commences whilst in the latter the haemoglobinuria only occurs at the end of the malaria infection when the animal is dying with an overwhelming mass of parasites in the blood. In short, the haemoglobinuria in monkey malaria is proportionate to the mass of the infection, just as it is in *Babesia canis* and other *Babesia* infections whilst in man the intensity of the haemoglobinuria appears to be quite independent of the intensity of the malaria infection.

Weise continues by saying, that the haemoglobin set free into the plasma is so rapidly removed that the concentration of haemoglobin aemia is low. Haemoglobinuria is thus a second source of haematin in blood serum. The conversion has been shown by Hamilton FAIRLEY who has demonstrated in the serum of blackwater fever cases a new pigment closely allied to methaemoglobin. The chemical and spectroscopic behaviour of this new pigment in the serum agrees with that of haematin. Fairley made a very interesting observation when he showed that it was possible to produce the new pigment *in vitro* by incubating human serum with haemoglobin for 24 to 48 hours. Weise has some doubts whether it is necessary to give a special name, methaemalbumin to a pigment which consists of a combination of haematin and albumin.

W. J.

LIU KYAI TE. Report of a Case of Blackwater Fever.—*Caducus* 1941 May Vol 20 No 2 pp 128-130

The author points out that three cases of blackwater fever have been reported in the Howloon Peninsula at Hong Kong during the past two years. He has recently come across a fourth case, and in view of the rarity of the disease in China he has decided to report it.

A clinical history is given and details of blood examinations. The points of interest appear to be that the patient was an immigrant to a place where malignant tertian malaria is common, and that there was an interval of five days between the administration of quinine and the appearance of haemoglobinuria, so that it is doubtful whether quinine had precipitated the attack in this case as it had done in previous cases.

W. J.

See also p. 279 ROBINSON. Favism in Children.

BRATTACHARJEE (Jagadish C.). Blackwater Fever in the Hills.—*Indian M d Gaz* 1941 July Vol 76 No 7 pp 419-420

ALTSCHULE (Mark D.) & GILLIGAN (D. Rourke). Acute, Massive Hemoglobinuria of Obscure Cause, with Jaundice and Anemia. Report of a Case with Clinical and Hematologic Studies and Measurements of the Blood Pigment Metabolism.—*Arch Intern Med* 1941 Nov Vol 68 No 5 pp 857-878. With 1 chart [Refs in footnotes.]

A clinical account is given of an unusual case of acute severe haemoglobinuria, accompanied by jaundice and slowly developing anaemia,

with final recovery. The clinical and laboratory findings in this case did not conform completely with those in any recognized type of haemolytic attack leading to haemoglobinuria. The continuance of the haemolytic attack for three weeks gave an unusual opportunity for studying the quantitative aspects of the haemolysis and many haematological studies were made. The authors summarize their observations as follows —

A case of acute massive hemoglobinemia and hemoglobinuria of obscure cause in which moderate jaundice and anemia developed is reported. Hemoglobinemia and hemoglobinuria were greatest during the first days after the onset of the attack and continued for approximately three weeks.

The red blood cell count decreased during the first two weeks of the attack from 4 710 000 to 2 900 000 and the concentration of hemoglobin in the blood decreased from 94 to 59 per cent. Clinical jaundice increased during the first four days of the attack and then gradually disappeared during the following week.

The spleen and the liver were enlarged during the attack. Subsequently the size of the spleen decreased slightly. Renal function was reduced during the attack and subsequently returned to normal. Hepatic function was normal.

Oxyhemoglobin and methemalbumin were identified spectrophotometrically in the plasma. The urinary pigment was chiefly oxyhemoglobin.

Quantitative studies of the hemoglobin of the plasma and the urine and quantitative studies of the fecal output of urobilinogen revealed the extent of hemolysis during the attack. Calculations based on the values for hemoglobin in the plasma and in the urine indicated hemolysis of the red cells of approximately 1 400 cc. of the patient's blood during the first week of the attack, of 400 cc. during the second week and of 200 cc. during the third.

Calculations based on excretion of urobilinogen in the stools collected from the fourth to the nineteenth day after the onset of hemoglobinuria indicated hemolysis of approximately 1 000 cc. of blood during this period as compared with hemolysis of approximately 1 300 cc. for the same period as calculated from the values for plasma hemoglobin.

The slow development of moderate anemia and moderate jaundice accorded with the amount of blood destruction represented by these calculations. The correspondence between the amounts of blood destroyed during the attack as calculated from the values for plasma hemoglobin and from the total urobilinogen excretion demonstrated that all of the hemoglobin from the blood destroyed during the attack was released into the circulation. This situation is contrasted with that in the hemolytic attacks occurring in some conditions in which more severe anemia develops with greater rapidity and yet in which there may be no evidences of intra-vascular hemolysis.

During the later stages of the hemolytic attack in this patient it was demonstrated that walking caused a definite but slight exacerbation of hemolysis. After the end of the attack, hemolysis could not be induced by walking or by standing. Exacerbation of hemolysis on walking did not occur in a patient with Malariae Micheli disease with associated hemoglobinemia.

The clinical manifestations and the laboratory findings in this case were not typical of those in any recognized type of hemolytic attack. No autoagglutinin could be demonstrated in the blood of this patient when tests were made on serum incubated in the cold or at body or room temperature. The fragility of the red cells to hypotonic solutions of sodium chloride was normal. The differential diagnosis of hemoglobinuria is discussed.

YULE (Charles L.) & CLARK (William F) Myohemoglobinuria. A Study of the Renal Clearance of Myohemoglobin in Dogs.—*Jl Experim Med* 1941 Sept 1 Vol 74 No 3 pp 187-196. With 3 figs. 14 refs

In this work the authors have studied the simultaneous renal clearance of myohaemoglobin and creatinine in the dog. As MONKE and Yule (1940) have already applied this method to haemoglobin a quantitative comparison of the renal excretion of the two substances can readily be made. A detailed account is given of the technique and of the experimental observations. These should be consulted in the original by those interested.

The results show that myohaemoglobin is cleared from the plasma about 25 times more rapidly than haemoglobin, but the mode of excretion appears to be similar for the two substances. The following summary is given —

When myohemoglobin is injected intravenously into dogs, in amounts ranging from 0.75 to 1.50 gm. it is rapidly eliminated from the plasma and approximately 65 per cent is excreted by the kidneys in from 1½ to 2½ hours.

Myohemoglobin does not appear in the urine below a threshold plasma concentration which is slightly under 20 mg per 100 cc but above this level the rate of renal excretion is directly proportional to the plasma concentration.

The maximum myohemoglobin creatinine clearance ratio averages 0.58 contrasted with a value of 0.023 for blood hemoglobin. This indicates that the rate of renal clearance of myohemoglobin is twenty-five times more rapid than that of blood hemoglobin. Evidence is presented that the excretory mechanism is essentially similar for the two substances but that differences in molecular weight account for different rates of glomerular filtration.

W 1

YULE (Charles L.) STEINMAN (John F) HAHN (P F) & CLARK (William F) The Tubular Factor in Renal Hemoglobin Excretion.—*Jl Experim Med* 1941 Sept 1 Vol 74 No 3 pp 197-207. With 1 fig

WHIPPLE (1932) has shown that the renal threshold for haemoglobin in dog could be markedly lowered by multiple daily injections large enough to cause haemoglobinuria. Histological examination of the epithelium of the convoluted tubules showed dense deposits of iron-staining pigment after repeated injections of haemoglobin and the lowered thresholds were attributed to a cessation of tubular reabsorption.

In order to obtain further information regarding the rôle of the tubular epithelium in renal haemoglobin elimination the authors decided to re-examine the phenomenon with the aid of the precise quantitative methods recently used by MONKE and Yule (1940) to determine the renal clearance of haemoglobin. The following summary of their work is given —

A drop has been observed in the renal threshold for hemoglobin in dogs, of over 80 per cent following repeated injections daily. It was not associated with a cessation of tubular reabsorption.

Hemoglobin excretion rate curves, obtained initially and after lowering the threshold, have proved to be parallel lines originating at the respective levels.

Hemoglobin containing radio-active iron has been used to determine the amount of iron retained by the kidneys 24 hours after injection

The kidneys of normal animals retain slightly less iron than those of animals with lowered thresholds, despite the fact that the former group has a much higher estimated rate of tubular reabsorption

It is suggested that hemoglobin products are more rapidly removed from the kidneys of normal animals, following reabsorption than from those of animals which have received multiple injections of hemoglobin

H Y

MISCELLANEOUS

BULLETIN OF THE HEALTH ORGANISATION (LEAGUE OF NATIONS.)
1940/41 Vol 9 No 3 pp 247-268. With 1 map—The
League of Nations Anti-Epidemic Work in China in 1939

Early in 1938 three units each staffed by several European medical men of wide experience arrived in China under the auspices of the League of Nations. Their functions included the establishment of laboratories the creation of health services and in particular the control of typhus plague cholera and smallpox. Malaria was one of the main problems along the China Burma highway and elsewhere and was thoroughly investigated with results which have been reviewed in this *Bulletin* 1940 Vol 37 p 792 1941 Vol 38 pp 103 501 502. Some of the details of these investigations are given in the present report

Cholera broke out in Hunan in 1938 and spread to Yunnan and many foci were found about 4 000 000 vaccinations were performed in Hunan. Plague is endemic in the north of Burma among the Shan tribes and there was a severe outbreak near the Chinese frontier it is recognized that danger appears to lie along the old caravan routes and the Burma road. Typhus was present in refugees in the north west and relapsing fever was also found especially round the city of Sian where in the first half of 1938 almost 60 per cent. of the refugee patients admitted to hospital were suffering from that disease

Endemic goitre is widespread in the mountains of Southern China and means were devised whereby potassium iodide was incorporated in the native rock salt which constitutes the sole supply of sodium chloride in Yunnan. Potassium iodide was also administered periodically to schoolchildren

C II

WAR MEDICINE Chicago 1941 July Vol 1 No 4 pp 539-568—Notes on the Treatment and Control of Certain Tropical Diseases. Circular letter No. 56 from the Office of the Surgeon General, War Department, Washington, D C

The diseases dealt with are—Cholera dysentery (amoebic and bacillary) filariasis hookworm infection leishmaniasis, malaria and blackwater fever onchocerciasis oroya fever punta plague relapsing fever schistosomiasis yaws and yellow fever. This alphabetical order is presumably adopted for ease of reference. In each case the geographical distribution is given and brief statements are made concerning the aetiological agents methods of transmission and diagnosis. The

treatments advised are those in common use but as in the case of sulphaguanidine in bacillary dysentery and sulphathiazole in plague, recent experimental work has not been overlooked. The outlines of preventive measures are included.

The notes are presented in tabular form and are dogmatic in expression—they should prove to be of great value to medical officers brought for the first time into contact with tropical diseases. C II

FARRELL (Elleston). Recent Progress in Tropical Medicine.—*U S Nav Med Bull* 1940 Jan. Vol 38 No 1 pp. 80-90 [89 refs]

GROSH (R. K.) A Case of Confluent Smallpox Treatment—Chemotherapy.—*Indian Med Gaz* 1941 Sept. Vol 76 No 9 p. 544 With 1 chart

The patient had confluent smallpox and was in a highly toxic state with delirium, for a week though the temperature was not very high. From the fourth day of illness he was given sulphonamide tablets (Albert David) or Dagenan (sulphapyridine) three tablets daily (each presumably of 0.3 gm) and was discharged cured after a month, the temperature becoming normal in 10 days after this treatment was started. C II

BRAS DE SA. An Epidemic of Pemphigus in a Village of Bardax.—*Argwiro da Escola Méd-Cirurg de Nova Goa* 1838 Ser A No 12 pp 303-308.

This is an account of an outbreak of 34 cases of a contagious form of pemphigus in a single village. 10 cases occurred in members of one Hindu family. The incubation period was 10 to 14 days there was initial fever to 104°F with delirium or convulsions (in children). An erythematous rash appeared on the second day beginning on the face and extending to the body. Within a few hours the rash became papular vesicular and bullous the bullae were round or irregular and were not umbilicated they are described as being as large as beans. The bullous fluid became seropurulent and if the bulla burst there was left an ulcer which healed in a fortnight leaving a scar. The rash was generalized and was accompanied by sensations of burning and pain. In non-fatal cases the temperature subsided after the fourth or fifth day but in the 10 fatal cases death occurred between the fourth and ninth days from bronchopneumonia.

The disease affected children and adults and none of the patients had had smallpox or had been vaccinated. It was definitely a form of pemphigus and smallpox and chickenpox could be excluded. The aetiology is unknown attempts to cultivate an organism were unsuccessful, but the author appears to incline to the view that it may be a virus disease. C II

BROCH (Ole Jacob). Trombopenisk purpura etter kinidin. [Thrombopenic Purpura after Treatment with Quinidine].—*Nordisk Med* 1941 May 17 Vol 10 No 20 1542-1544 [10 refs] English summary

* A 27 year old woman was admitted to the hospital for thrombopenic purpura after taking quinidine for a period of 14 days. During

the preceding half year she had taken quinine for 4-5 weeks without having the slightest trouble

Definite thrombopenia without any other hematologic symptoms and without morphologic changes of the megakaryocytes in the sternal marrow was experimentally produced several times by administering 0.40 grams of quinidine sulphate per os. During the course of an hour the number of thrombocytes sank to about one fifth of their normal value. The lowest value was attained after five hours. The original values were approximately reached after 48 hours.

In essential thrombopenia it is a recognized fact that the decrease in the number of blood platelets is brought about by the reticulo-endothelial system. Further details of this mechanism are as yet unknown. It is probable that allergic thrombopenia has a similar mechanism but that no direct effect is exerted on thrombopoiesis. The rapid drop and the rather quick remission favour this belief.

It is probable that no actual destruction of the blood platelets occurs but that the blood platelets are only temporarily withheld from the circulation. The reticulo-endothelial system plays a decisive rôle in this process.

ROBINSON (P) **Favism in Children.**—*Amer Jl Dis Children* 1941
Oct Vol 62 No 4 pp 701-707 [17 refs]

During March 1939 the author and his colleagues in Palestine came across three children with severe acute haemolytic anaemia of unknown origin. The symptoms and the course of the illness resembled those of Lederer's anaemia of which about 70 cases mostly in children have been recorded from different countries. The course of the present disease is highly dramatic. The onset is sudden and within a few days or even hours during which vomiting is the most striking symptom a serious state arises which is hard to interpret. The skin is pale grey or yellowish and eyes are sunken and dull and consciousness becomes clouded. The urine is brown or red. Examination of the blood shows severe anaemia. The course of recovery is even more remarkable than the onset. The patient who was apparently dying a short time previously sits up in bed asks for food and apart from being anaemic seems absolutely normal. The improvement of the blood is steady but slow normal values are found after at least a week. Very few of the patients die.

Details are given regarding one of the author's cases and the numerous clinico-pathological observations made during several days of illness are summarized in a table.

In March 1940 the three children seen the previous year came under observation again suffering from the same disease. This disposition to relapse and the marked eosinophilia in the blood and the bone marrow compelled the author to discard his original diagnosis of Lederer's anaemia and to look for another explanation. Various workers have drawn attention to the fact that some patients described as having Lederer's anaemia may in reality have had haemolytic icterus. In the present cases however splenomegaly and jaundice were present only during the attacks. The osmotic resistance of the erythrocytes was normal or increased. Spherocytosis was never observed. The bone marrow picture resembled that described by MAINZER and JOEL (1938) in a case of anaemia due to lack of vitamin A.

[April, 1942]

About the same time that the three original patients came under observation again a boy of 1½ years, the son of a farmer was admitted to hospital with uraemic coma. The history was typical of Lederer's anaemia but the mother mentioned that on the farm broad beans (*Vicia faba*) were being cultivated and that two days before the child who liked the blossoms and the beans of the plant very much had eaten some uncooked beans. This recalled to the author's mind the condition known in Italy and Greece as favism. Favism is an acute haemolytic anaemia due to the ingestion of broad beans and has been known for centuries in the Mediterranean region. The disease is said to be especially common in Sardinia and Sicily. Besides the haemolytic anaemia which is the severest form of the disease there may also be other conditions due to the same cause such as fainting, vomiting or diarrhoea. The morbidity rate in Sardinia is as high as 5.17 per cent with a case mortality rate of 8 per cent. Only two cases have been reported in the United States and the disease has never before been observed in Palestine. According to HUTTON the factor of heredity is of importance in 20 per cent of cases.

On going back into the history of his cases, Robinson found that all of the first three patients, whom he considered to be suffering from Lederer's anaemia, had fallen ill, both the first and the second time one or two days after eating broad beans. He was unable to trace two other patients seen in 1899 but in August 1940 a 12 year-old boy, an acute haemolytic anaemia a day after they had eaten broad beans. Both of them survived. Robinson writes that it is remarkable that at least three of his patients were particularly fond of broad beans.

The following summary is given —

During the last two years my associates and I have observed a disease which seems to have been hitherto unknown in Palestine. The disorder is favism, an acute haemolytic anaemia due to ingestion of broad beans (*Vicia faba*). Favism is not uncommon in Sicily and Sardinia only sporadic cases have occurred in other countries for example amongst Italian immigrants in the United States.

The onset of the illness is sudden. The first symptoms are vomiting and diarrhoea. The urine is reddish-brown the skin turns pale gray the eyes become sunken and consciousness is clouded. The number of erythrocytes may fall to 1 000 000 or less per cubic millimeter and the hemoglobin content to 10 per cent. Recovery which begins spontaneously in general is assisted by blood transfusions and takes one to two weeks. Fatalities are rare. The course of the illness resembles that of Lederer's anaemia, but in favism relapses are common.

Examination of the bone marrow suggests that there are a stoppage of the production of red blood cells during the haemolytic period and excessive production during the first days of recovery.

We observed 6 patients with the disease. 3 of them had two attacks. We believe that this disease is more common than is supposed and suggest that some of the patients with so-called blackwater fever may in reality suffer from favism.

W. Yorke

SCHMIDT (G.) Effect of Sun Stroke on the Central Nervous System.—
Dent. Ztschr. f. Nervenheilk. 1940 Vol. 151 pp 146-152
[Summary taken from *Jl. Irind. Hyg. & Toxicol.* 1941 June
Vol. 23 No. 6 pp 110-111 Signed L. Telck.]

A soldier had a sun stroke in 1937 and suffered stiffness of the neck paresis of the right arm and bradycardia. Severe headaches, tonic clonic cramps aphasia and right hemiplegia appeared a month later.

These symptoms improved slowly for 14 days but epileptic spasms occurred over longer periods. In December 1839 the man was hospitalized and displayed weakness headache dizziness and the deep reflexes on the right were more active than on the left. On the right side of the body sensitivity to pain and temperature was diminished. Encephalography showed definite enlargement of both lateral ventricles especially of the left and of the third ventricle. The whole ventricular system was distorted to the left. The brain substance was atrophic especially in the frontal lobe and adhesions were present between the pia mater and the brain surface. The author believes that the sun stroke produced profound disturbance of the cerebral circulation. He stresses that such seemingly neurasthenic complaints have a true organic foundation.

BONAC (Joseph) *Le coup de chaleur en mer (Etude clinique pathogénique et thérapeutique)* [*Heat Stroke at Sea.*]—*Ann d'Hyg Pub Indust et Sociale* 1941 Sept-Oct Vol 19 No 5 pp 204-218

REVIEWS AND NOTICES

STRICKLAND (C.) [M.A. M.D. Fellow Royal Geographical Society etc.] *Deltic Formation with Special Reference to the Hydrographic Processes of the Ganges and the Brahmaputra.* With a Foreword by Frank DEBENHAM O.B.E. M.A. and an Introduction by Cyril FOX D.Sc. M.I.Min.E. etc. pp xii + 157. With 72 figs & 1 map. 1940. London New York & Toronto Longmans Green & Co. Ltd. [9s.]

During the last century there has been much controversy regarding the relation of the peculiar conditions arising from the changes in the course of the many mouths of the Ganges and Brahmaputra rivers and the silting up of some of them to the incidence of malaria in this large area. The author of this little book is a Calcutta medical entomologist who has closely studied the hydrography of this region and describes it as a preliminary to a proposed sequel on the joint relationship of man and mosquitoes to the Bengal Delta. As pointed out in a foreword by a geologist the Bengal area dealt with is not a true delta in the sense of the Nile and Mississippi as the conditions are more complicated.

Although this volume deals solely with physical geography and geology the author betrays his medical interests in such headings, to some of the 27 sections into which he divides his subjects as 'The sea in pregnancy' 'The birth and infancy of the land.' He traces successively the deposition of alluvium brought down by the mighty rivers the raising of the sea coast above the interior by tidal action leaving a series of low lying jheels or shallow lakes behind the coast the formation of the khals or outlets to the sea, the elevation of the river beds above the surrounding country with overspill of the water during the rains etc. Tidal action seasonal changes underground flow of small rivers at the foot of the hills seepage of water to the surface and the death of rivers through becoming silted up as the

main stream of the Ganges forced its way to the sea further and further to the East are all described. The last and longest section discusses geological theories to account for the extensive sheets and tracts which are below sea level and the influence of diastrophism of the earth's crust on the hydrographic processes." Here he rejects the view that the depressions are due to diastrophism or seismism.

In the work are reproduced many illustrations from geological and geographical books together with a number of explanatory diagrams. Some of these have had to be so much reduced as to require a magnifying glass for their study. It would have been advantageous if some of the technical terms had been more clearly defined and many of the very numerous footnotes had been embodied in the text. The book should be read by those interested in the very special problem dealt with. The promised sequel will doubtless prove of greater interest to practitioners in the tropics, and especially to malarialogists.

Leonard Rogers.

ROGERS (Leonard) [K.C.S.I. C.I.E. LL.D. M.D. B.S., F.R.C.P., F.R.C.S. F.R.S. etc.] & MEGAW (John W.D.) [K.C.I.E. B.A., M.B. Hon.D.Sc. (Queen's University Belfast) etc.] *Tropical Medicine*. Fourth Edition—pp. xii+536. With 2 coloured plates & 87 text figs. 1942. London: J. & A. Churchill Ltd. 104 Gloucester Place, Portman Square. [21s.]

In general this edition maintains the form of its predecessors; the arrangement of the contents is much the same, length has been reduced by a few pages, and certain modifications have been introduced. But in spite of the apparent similarity it is evident that the authors have made considerable changes. There has been a good deal of re-writing and room has been found for mention of most of the significant work which has appeared since the last edition was published. For instance the recent work by SMITH HALDER and ARMED on the transmission of kala azar by sandflies, which has added emphatic support to a long held theory and has placed it on a basis almost of certainty is recorded. In the same disease the new diagnostic method of gland puncture and treatment by the stilbene group of drugs are not overlooked. Similarly new work on the treatment of plague with sulphonamides is mentioned. Epidemic dropsy is discussed in the light of the Indian work which indicates that it is due to poisoning by the oil of *Argemone mexicana* and in the same section of diseases associated with diet, there is an expanded description of the nutritional anaemias. New tables of the classification of dietetic diseases, and of the vitamins together with the diseases associated with deficiency and the therapeutic reference and comprehension.

Some of the sections deal with diseases on which the authors are recognized authorities, and these, for instance cholera, leprosy, the typhus group and the dengue group could hardly be bettered. In cholera the association of high relative humidity and epidemic outbreaks is fully discussed, and the problems of bacteriology and pathology are clearly set out. The description of fevers of the typhus group that can yet be made of a complicated subject.

The helminthic diseases, as before are confined to ankylostomiasis, the filarial diseases, and schistosomiasis for practitioners in the Far

East it might be wise to add in future editions sections on infections with the common trematodes of those regions *Clonorchis sinensis* *Paragonimus ringeri* and *Fasciolopsis buski*.

The main interests of this text book are clinical and epidemiological. The needs of the clinician are indeed very fully met and the book is a mine of information gathered largely from personal experience supported by wide knowledge of the literature. On the epidemiological side a suggestion might be offered that the complexities of anopheline transmission of malaria could be outlined more fully.

The book is better even than the former edition and the high standards of learning and experience which have gone to its composition are evident throughout but it remains concise and well ordered. The rapid exhaustion of the previous edition testifies to its value the present edition can be even more fully recommended to all clinicians in hot countries.

C. H.

Muir (Robert) [M.A. M.D. Sc.D. LL.D. F.R.S. Emeritus Professor of Pathology University of Glasgow etc.] *Text-Book of Pathology* Fifth Edition.—pp. vi+991. With 599 figs. 1941. London: Edward Arnold & Co. [35s.] [This review appears also in *Bulletin of Hygiene*.]

Since the first appearance of this book in 1924 in addition to five reprints it has now reached the fifth edition. The work was written primarily as a text book for students and these facts are in themselves a sufficient testimonial to its popularity. Indeed Muir has already contributed to the education of many generations of students in pathology just as Muir and Ritchie did to that of previous generations in bacteriology. Here is condensed the unique knowledge which Sir Robert Muir has accumulated during a long life as teacher, observer and experimentalist and we have reason to be grateful for this permanent record of his experience. Thus the book becomes not only a text book for students but also one which is a valuable addition to the shelves of all medical men especially of those who have not access to a medical library.

The new edition has been brought completely up to date without any increase in length or considerable rearrangement of contents but with the addition of some 30 new text figures. The illustrations in general are much crisper than in previous editions and consist almost entirely of photographs or photomicrographs of actual specimens in the possession of the author or his colleagues. There is no doubt that this method of illustration is much to be preferred to the more elaborate diagrammatic or semi-diagrammatic pictures of some other (especially American) text books. By the study of these figures the student can easily recall what he has actually seen in the post-mortem room and museum or under the microscope. The font has been changed in the new edition and this is a welcome improvement though it may be mentioned in passing that the rather numerous printer's errors are an unfortunate occurrence.

In his preface to the first edition Sir Robert explains that his book is based upon the course of instruction which he gave in Glasgow University keeping in mind firstly the scientific aspect of general pathological processes and describing secondly those pathological changes which are of special importance in relation to clinical medicine.

[April, 1942]

and surgery. Thus the early chapters are devoted to general considerations such as disturbances of the circulation, inflammation, repair, disturbances of nutrition, infection and tumours, while the later ones consist of descriptions of the diseases of each system in turn. Where, as in the field of cancer research, new knowledge and theories are being rapidly added to well-established facts, care has been taken to sift hypotheses from fact with the result that a clear and succinct account of tumours and of the diseases of the haemopoietic system. Following a very good description of the blood and the pathological changes which the component elements may undergo is a simple yet fundamental classification of the anaemias and a clear account of these and the hyperplastic diseases, i.e. leukaemia and erythraemia. This section closes with a description of the haemorrhagic diseases.

Of necessity the chapters concerned with diseases of the reproductive system and endocrine glands are short but all the essential facts are there and reference is made to larger works where more detailed information can be obtained. Sir Robert's interest has, in recent years, been directed towards the study of cancer of the breast and thus the short section on Bright's disease the author acknowledges his indebtedness to the writings of his pupil and colleague Professor Shaw Dunn whose work has contributed much to the elucidation of the mechanisms involved in this very difficult and complicated subject.

In the chapter on Bright's disease the author acknowledges his indebtedness to the writings of his pupil and colleague Professor Shaw Dunn whose work has contributed much to the elucidation of the mechanisms involved in this very difficult and complicated subject. After reading in addition the more recent publications of Professor Ellis (*Lancet* 1942) it does seem as if we are now entering upon a new phase in the understanding of this complex of diseases.

This is not a text-book of tropical pathology but naturally there are many references to the diseases of warm climates, notably malaria, bilharzias, cholera, dysentery, kala azar, leprosy and schistosomiasis. In addition some five pages are devoted to other helminthic parasites of man and their pathogenic effects, including hydatid disease. These short but pithy accounts provide most of what a student working for a medical qualification in these islands might reasonably be expected to know.

This is a book to be read and studied, not to be lightly skimmed. It is a mine of accurate information presented in ordered sequence—each paragraph planned and depending upon that preceding it, each argument developed step by step. Sir Robert Muir is to be congratulated and thanked for this new edition of his book.

Georgiana M. Bonser

TROPICAL DISEASES BULLETIN

Vol 39]

1942.

[No 5

SUMMARY OF RECENT ABSTRACTS *

IV TRYPANOSOMIASIS

Epidemiology

In Nigeria during 1939 WALKER (p 631) reports that of almost 500 000 persons examined 4 per cent were found to be infected. Previously diagnosed cases are evidently not included in this figure and the total incidence is stated to have been about 6.7 per cent. In miners of the Kabba Ilorin goldfield the infection rate is as high as 40 per cent but in the Zaria Emirate it has fallen very greatly in recent years it is the latter area in which mass campaigns have been conducted since 1933. In the endemic areas of Belgian Congo VAN HOOFF (p 631) reports that during 1939 more than 5 000 000 natives were visited that 12,886 new cases were diagnosed and that 40 510 old cases were kept under control.

In Nyasaland LAMBORN (p 72) has investigated the incidence of sleeping sickness by the examination of blood from all available persons in one area but recognizes that concealment of cases may have taken place. Along the lake shore where conditions suitable for food cultivation are good and along the rivers of the south where there is extensive cultivation of broad stretches of land, conditions are unfavourable for tsetse flies and major outbreaks are unlikely. Most of the population is settled in these areas but in villages within the fly area, where clearings are insufficient to protect the natives minor epidemics are not unlikely. Isolated cases have occurred in scattered villages and it seems probable that these can only be explained on the assumption that game animals are the reservoir of infection.

Aetiology

Most workers believe that the trypanosomes of man must have been derived originally from *T. brucei* but have not been able to demonstrate how this change has been made. HARDING (p 75) reports an experiment in which an attempt was made to throw light on this question.

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Working with a strain of *T. brucei* sensitive to human serum, he has found that feeding *G. tackenoides* containing developing trypomastotes on human blood fails to produce any increase of resistance to human serum.

HAWKING (p. 633) reports experimental work which shows that *T. rhodesiense* from patients who have relapsed after treatment with trypanamide have greater resistance to this compound than have those from untreated patients. He thinks that this resistance is acquired (during unsuccessful treatment) rather than natural (originally present and responsible for the relapses) and quotes the case of one patient in whose trypanosomes there appeared to be a definite increase in resistance after a second course of trypanamide over that which existed after the first course. He (p. 78) failed to find evidence of abnormal resistance to Bayer 205 in *T. rhodesiense* from patients in a state of relapse after treatment with this drug. He further (p. 306) notes that two strains of *T. rhodesiense* resistant to human serum when fresh from the human hosts, became sensitive after passage through rats.

VANDERPLANK (p. 632) records experiments which suggest that the transmissibility to the fly and the virulence of a strain of *T. rhodesiense* in rats may be enhanced by passing it through animals with low mean body temperature. In a letter subsequently published in the *Trans Roy Soc Trop Med & Hyg* 1942, Vol. 35, No. 4, p. 239 however HORSLEY points out that the animals used are not homothermic and that their body temperatures vary greatly throughout the hours of a hot day. He therefore questions the soundness of the hypothesis that the modification is a function of the normal blood temperature of the host.

Transmission

JACKSON (p. 307) has studied *G. morsitans* in Tanganyika Territory by capturing, marking and recapturing flies in a defined area of land. The flies are confined by vegetational types to certain ambits from which they rarely stray and are generally prevented from moving more than half a mile in any one direction. The average life of the male flies is 2-6 weeks throughout the year but is longest in the rainy season. In the dry season many die of starvation, for at this time many feeds are needed. Females move more extensively than males through the savannah and probably live longer. In a further communication the same author (p. 632) points out that since females live about twice as long as males the female population is about twice as great as the male. As a result of the relatively slow drift outside the ambits, wandering game animals have very little effect in aiding dispersal of the flies. If seasonal tiring of bush is prevented the fly population falls until the middle of the rains. This effect may be due to destruction of pupae by ants. Marked flies do not live as long as unmarked but the reason for this is not known.

JACK (p. 307) gives details of the behaviour of *G. pallidipes* *G. brevipalpis* and *G. morsitans* which cannot be further abstracted. In KENYA TRENDLE (p. 306) by the examination of female *G. pallidipes* caught in blocks of riverine bush, has found that the proportion of infertile females is approximately the same in all the areas, there being no evidence that a higher proportion of infertile females is to be found in the more sparsely populated areas. Even when the

population of *G. palpalis* is reduced to a low level there is no indication that males and females find difficulty in meeting or that the remaining population is likely to die out of its own accord.

ZUMPT (p 74) discusses the classification of the subspecies of *G. palpalis* and their distribution in the Belgian Congo

Clinical Findings and Treatment

SALBUN (p 304) gives information on the diagnosis of trypanosomiasis of man in French Equatorial Africa. No one method of examination can be relied upon if the result is negative but the most important are examination of gland juice triple centrifugation and lumbar puncture. Thick blood films give few positive results and the author considers that examination of bone marrow cannot replace older methods. He gives details of the present condition of patients diagnosed several years ago. In discussing the question of reinfection the author while admitting that proof has not been obtained expresses his opinion that immunity either does not occur or if it does is not of long duration in a person recovered from a previous infection.

McLETCHIE (p 76) reports on the use of 4-4-diamidino stilbene in human trypanosomiasis in Nigeria. In a small series of cases without marked involvement of the nervous system he found it to be apparently as effective as Bayer 205. Patients with mild infections received an average total dose of 8.8 mgm. per kilo those with more advanced disease an average of 6.3 mgm. per kilo. In the latter group reactions to the drug were seen these reactions were usually transient. It was found that most patients could stand intravenous injections of 1-1.5 mgm. per kilo and some 2 mgm. per kilo. Six injections were given within 9 days and the author remarks on the advantage of this short course but advises increase to 10 injections [presumably in a correspondingly longer period] for routine treatment. In Gadau N Nigeria however HARDING (p 77) found improvement after 4-4-diamidino stilbene only in cases in which the cerebrospinal fluid was not abnormal. In general the disease is of a severe type in this area and the author found pathological changes in the cerebrospinal fluid in 94 of 100 unselected cases most of the patients exhibited nervous symptoms. He concludes therefore, that although in this area the drug does not appear to offer advantages over antypol and tryparsamide, it may in other places where the disease presents a different character lead to better results.

In the Gambia BOWSMAN (p 310) has obtained good results with 4-4-diamidino stilbene given intravenously in doses of 1 mgm. per kilo of body weight twice each week to a total of 7 to 10 injections. He considers that larger doses are not altogether safe and describes the reactions which may occur after intravenous administration—head ache sweating tachycardia vomiting weakness of the pulse and fall in blood pressure. There is rapid amelioration of all symptoms and physical signs but cases in which the protein of the cerebrospinal fluid is above 0.05 per cent are not suitable for this treatment. The drug does not cause eye symptoms or albuminuria and has the advantage that treatment can be carried out in half the time necessary for tryparsamide.

FRIEDHEIM (p 634) reports good results from the use of the sodium salt of 2-4-diamino-6-(arsono-anilino) triazine known as

Tropical Diseases Bulletin

triazine arsenic acid (No. 4289) This was tried in cases of sleeping sickness in French West Africa, and the dosage is set out in detail. The only toxic effects were gastrointestinal. Clinical cures were observed in 29 cases re-examined up to 9 months after treatment. Oral treatment is possible and though the effects are slower than after injection, no relapses were observed in a few patients thus treated. HAWKING (p. 78) found that, in patients who had relapsed after treatment with Bayer 205 the concentration of the drug in the blood was less than that in comparable patients who had not relapsed, and concludes that defective accumulation of the drug was one of the main factors responsible for the relapses.

HAWKING (p. 312) has investigated the trypanocidal activity against *T. gambiense* of human blood 24 hours after injection of trypanamide. This activity rises to a maximum 4 days after injection and then diminishes so that after 4 days it is inappreciable. The activity in the blood is rather greater than that in the cerebrospinal fluid. In the cerebrospinal fluid he (p. 313) found trypanocidal action after injection of trypanamide, to be greatest between 17 and 65 hours after injection. Lesions of the cerebral membranes due to *T. rhodesiense* and indicated by increase of cells and protein in the cerebrospinal fluid, do not, apparently exert any constant influence upon the penetration of trypanamide into the fluid or on its activation there, but the degree of trypanocidal activity produced is insufficient to exert much effect upon fresh isolated strains of *T. rhodesiense*. With neocryl and undecane di- midine the trypanocidal activity produced was insignificant.

ACRES (p. 311) has compared neocryl with trypanamide in the treatment of sleeping sickness in the Belgian Congo. In first stage cases he considers the two drugs to have somewhat similar beneficial effects in second stage cases neocryl compares very unfavourably with trypanamide. ROOS (p. 75) gives details of his findings in a comparison of the toxicities of trypanamide and neocryl when used in the treatment of neurosyphilis. Neocryl is less toxic than trypanamide and he states that it is to be preferred in all cases of neurosyphilis in which pentavalent arsenicals are necessary.

Control.

For the control of sleeping sickness in Nyasaland LAWSON (p. 72) suggests that a system of diagnosis which may overcome the difficulty of concealment of cases should be instituted, in which blood slides are taken by vaccinators and dispensers, of all sick persons and especially of all persons with fever. An indirect attack on the fly might be carried out through measures directed against game animals. This procedure would entail modification of the game laws.

In South Kavirondo, Kenya, TRENDALE (p. 306) reports that by the use of the block method of clearing riverine bush, in which blocks several miles long have been divided by clearings about 1 000 yards wide, the density of fly has been reduced from 100-200 tsetse per fly-boy-day to about 1 per fly-boy-day. This has been effected by hand catching within the blocks, squads of boys having patrolled regularly and having caught enormous numbers.

WALKER (p. 631) states that in Nigeria, where work on a clearing of 880 square miles is far advanced, most of the tributary streams dry up in the dry season, so that barrier clearings are being made to prevent tsetse from spreading back from the larger rivers, which are the permanent foci, during the rains.

CHAGAS'S DISEASE

Epidemiology and Reservoir Hosts

Reports of cases of Chagas's disease have been published from Chile (p 80) and Minas Geraes (p 639). DIAS (p 639) shows how a cat became infected after eating infected rats. There is little doubt that cats and dogs which eat rats and small sylvan mammals become infected in this way and so become intermediaries from which human infection may occur. It is possible that they may similarly become infected through eating infected insects. In Chile the known reservoirs of Chagas's disease comprise 22 wild animals and the dog and cat. GASIĆ LIVACIĆ and BERTIN (p 82) give a list of the animals and note that in some districts the proportion of infected animals is high. MAZZA (p 315) gives a list of animals found infected in Jujuy and Salta provinces of the Argentine. PIFANO and DIAS (p 639) have found trypanosomes in the blood and leishmania forms in the heart and stomach of the bat *Carollia perspicillata* in Venezuela. These were capable of infecting a number of Reduviid and other bugs and work is to be done to prove whether the flagellate is *T. cruzi*.

Aetiology and Transmission

MAZZOTTI (p 81) records the results of the inoculation of mice with *T. cruzi*. KOLODNY (p 81) has shown that in rats kept at a temperature of 40 to 45 F infection with *T. cruzi* pursues an intense and acute course with blood stream invasion much heavier than in animals maintained at ordinary room temperature. PACKCHANIAN (p 637) has grown *T. cruzi* on rabbit blood agar slopes and has used killed and living cultures for injection of rabbits. Agglutinins against the trypanosomes were found in high titre after this immunization but with the sera of animals infected with other trypanosomes the maximum titre observed was only 1/32. Details of technique are given. GASIĆ LIVACIĆ (p 82) found infection in Triatomidae of Chile in the following proportions—adults 40 per cent, nymphs 21.9 per cent and larvae 19.6 per cent. PACKCHANIAN (p 81) found infection with *T. cruzi* in 65 per cent of *Triatoma heidenhanni* caught in Texas but none in *T. sanguisuga ambigua* caught in Florida though the latter is capable of transmitting the infection.

Pathology and Clinical Findings

MAZZA and MIRARA (p 317) found leishmanial forms of *T. cruzi* and characteristic histological changes in an inoculation chagoma removed from a man whose blood was negative to thick drop examination and to the xenodiagnostic method and in whom smears of tissue taken from the lesion were also negative. MAZZA *et al* (p 318) describe the characteristic pathological lesion found in inoculation chagomata—it consists of fat necrosis of the tissue cells especially of the subcutaneous fat. This is not a secondary change but is part of the initial inflammatory stage of invasion and is a manifestation of the colonization of the leishmania forms in the fatty tissue. Secondary tumours may follow the primary inoculation.

chagomata and may be widely spread. The authors record one case in which the tumours rapidly disappeared after treatment with Bayer 7602 to a total dosage of 20.2 mgm. per kilo. body weight. The patient was a man of 50.

MAZZA and JORGE (p. 318) have produced nodules of reticular histiocytes indistinguishable from the lesions of Chagas's disease by the injection of filtered emulsions of the disintegrated bodies of *T. cruzi* taken from culture. The nodules are apparently due to a water soluble substance which is not dialysable, and it is inferred that it is the destruction of the protozoon in inflammatory foci or in macrophages which gives rise to these nodules in infected animals.

MAZZA and FREIRE (p. 316) describe cases of local inoculation chagomata with secondary haematogenous tumours.

MAZZA and LUCIELAY (p. 318) describe the cutaneous lesions of Chagas's disease and describe a case in which an inoculation chagoma was associated with a morbilliform eruption. Treatment with Bayer 7602 was quickly followed by disappearance of the ocular symptoms and fading of the rash. MAZZA *et al.* (p. 317) describe a case of a child in which there were secondary chagomata widely distributed over the body. Improvement followed the administration of Bayer 7602 in doses of 80-120 mgm. per kilo. body weight.

DUSSEY *et al.* (p. 83) describe the Machado complement fixation test for Chagas's disease for which the antigen is obtained from the spleen of infected puppies. It is valuable in diagnosis of chronic cases, but is rarely positive until 30 days after infection. It is not absolutely specific, being positive in cases of African trypanosomiasis and leishmaniasis, but tests in normal and erythemic persons were found to be negative.

MAYER and PIFASO (p. 640) describe the preparation of cruzin from *T. cruzi* with this they have performed intradermal tests, and have obtained definite positive results in infected persons attaining maximum in 48 hours. The test appears to be of great use in diagnosis.

Charles Willocks

MALARIA

KRUM (Henry W.) & RUIZ (Horacio). Investigación sobre malaria y zancudos en Costa Rica. Informe anual del reconocimiento del paludismo y de mosquitos en el República. [Investigation of Malaria and Mosquitoes in Costa Rica. — Reprinted from *Memoria de Salubridad Pública y Protección Social de 1938*. 32 pp. With 7 maps. 1940. San José Costa Rica. Imprenta Nacional.]

This is a concise report which gives a vast amount of information concerning the geographical distribution of malaria and of mosquitoes in Costa Rica. Costa Rica presents a surprising variety of climatic conditions considering its relatively small size a variety dependent upon differences of altitude. The shortest distance between the Atlantic and Pacific coasts is only 75 miles. Malaria is almost confined to the low-lying coastal plains. The elevated range that forms the backbone of the country is free from malaria save for occasional epidemic outbreaks in certain of the river valleys in the upland. During a year 8,798 children below 13 years of age were examined at 1

places in nearly all parts of the country. They were mostly school children but in the province of Limón where schools are few and far between children were collected in some convenient building with the help of the police. Most attention was paid to the low-lying provinces in which malaria is most prevalent. The spleen rates of the different provinces with the number of children examined in each (shown in brackets) were as follows: Alajuela (949) 1.5, Cartago (1 191) 3.9, Guanacaste (3 601) 17.2, Heredia (80) 0.0, Limón (1 550) 11.9, Puntarenas (1,362) 16.5 and San José (65) 3.1.

Blood films from 3 838 children were examined mostly by the thick drop method but thin smears were also made. The findings were correlated with the results of the spleen examinations. Of 2 996 children showing no parasites the spleen rate was 15.3, of 180 with *P. vivax* the spleen rate was 77.8, of 213 with *P. falciparum* the spleen rate was 74.2, of 226 with *P. malariae* the spleen rate was 80.5, of 57 with mixed infections the spleen rate was 88.0, of 166 with unidentified parasites the spleen rate was 62.1. *P. malariae* was most common along the Pacific coast.

During the inquiry 88 species of mosquitoes were identified, these are listed. The species of *Anopheles* found were as follows (the number of places in which found is inscribed against each): *A. albimanus* (87), *A. argyritarsis* (74), *A. tarsimaculatus* (4), *A. strodesi* (15), *A. pseudopunctipennis* (60), *A. eiseni* (12), *A. apicimaculis* (41), *A. punctimacula* (14), *A. neomaculipalpis* (11), *A. vestitipennis* (3), *A. nevae* (2) and *Chagasia bathanensis* (17). All the evidence collected supports the view that *A. albimanus* is by far the most important if not the only vector of malaria in Costa Rica.

In all 19 602 mosquitoes were identified. *Anopheles* dissected numbered 593 of which 559 were *A. albimanus*. One of this species was infected.

Norman White.

KUMM (Henry W.) VOLIO (Enrique) & RUIZ (Horacio). Malaria. Reconocimiento y control realizados en cooperación con el Gobierno de Costa Rica. [Investigation and Control of Malaria carried out in Cooperation with the Government of Costa Rica.]—Reprinted from *Memoria de la Secretaría de Salubridad Pública y Protección Social correspondiente al año 1939* 16 pp. With 8 maps 10 figs & 1 chart.

In Costa Rica malaria is almost confined to the low-lying coastal plains. Along the Pacific coast *A. albimanus* the vector is most numerous during the rainy season.

The greater part of this report consists of a description of the anti-malaria surface drainage work that has been carried out in Liberia, the capital of the Province of Guanacaste, a small town with a population of 2 574 at a cost of £90 700 *. The results have proved very satisfactory. The spleen rate fell from 37.5 per cent in March 1938 to 8.9 in November 1939, in the town of Las Canas near by where no similar measures were undertaken the spleen rate was 16.8 per cent in February 1938 and 20.6 in November 1939. Further drainage schemes for Las Canas and Santa Cruz have now been put in hand.

v. H.

* Represents the Colon, a coin quoted at the rate of 5.62 to the American dollar.

May 1942

significance until it has been tested by experimental methods. On the other hand, when water is polluted by decaying vegetation, whereas *A. triseriatus* is not repelled, eggs being still laid at the height of pollution, gravid females of *summus* were proved in laboratory experiments to be extremely sensitive and to avoid even very high dilutions. The larvae however will develop normally in water with a degree of pollution 70 times as great as that avoided by the female. Clearly it is the sensitivity of the female that is the essential factor in control by "herbage packing". The identity of the repellent substance was not discovered.

In regard to silt which seems in nature to deter *summus* from breeding, the author shows in field experiments that the female mosquito will lay eggs and the larvae develop normally in very silty water and this was confirmed in the laboratory. He concludes that the controlling effects usually attributed to silt in rivers are probably due to the simultaneous increase in current velocity.

I. B. Wigglesworth

SEX (P) Aquatic Plants in the Ecology of Anopheline Mosquitoes.—
Jl. *Malaya Inst of Indica* 1941 June Vol. 4 No
PP. 113-137 With 1 plate & 2 charts. 23 ref.

The author working near Calcutta, studies the relation between the presence of twelve common aquatic plants and a dozen species of Anophelinae for the latter he collects larvae and also measures the emergence of adults with a trap net.

The paper contains a large body of fact not easily reduced or summarized. As an example one notes that *A. summus* is rare or absent among most plants but commoner in *Pistia* from which an average of 3.8 larvae and 0.9 adults are obtained per observation figures which give some indication of the mortality in pupal or late larval life. Other species are widely distributed among the plants and much more abundant for instance 4 *annularis* may be found with each sort of plant except duckweed (*Lemna*) and in the presence of *Hydrilla verticillata* attains the high density of 14.6 larvae and 3.1 adults per observation. Alternatively, if one looks at the matter from the botanical side one finds that *Pistia* may be associated with any of the local Anophelinae (except one species locally rare) whereas among *Lemna* one finds only 4 *Anopheles rubripes* and *negus*. The observations are interesting. They should if possible be analysed or supported by experiments. The practical value of the work is that one might use some readily seen plant as an "indicator" of the prevalence of a certain species of mosquito. P. A. Buxton.

DE MEILLON (Boths) & PEREIRA (Mário de Carvalho) Notes on Some Anophelines (Dipt. Culicidae) from Portuguese East Africa.—
Reprinted from *Voyages Documentaires Trimestriel* 1940
No 23 PP. 68-83 With 1 plate 7 figs. & 1 map.

A large part of this paper deals with the *summus* group of Anophelinae in Portuguese East Africa, and it emphasizes the difficulties of the identification. This group comprises 4 species, *A. ruficornis* and variety *gambianus*, and 4 *lesoni*. The differentiation of the larvae

of these forms is relatively easy along the lines established by LEESON. But the adult differences are still obscure. The relative importance of these species as malaria carriers was not investigated.

V B Wigglesworth

HURLBUT (Herbert S) & HEWITT (Redginal) Sporozoites of *Plasmodium lophurae* an Avian Malaria Parasite, in *Anopheles quadrimaculatus*—*Public Health Rep* 1941 June 27 Vol. 56 No 26 pp 1336-1337

The authors have succeeded in infecting *A. quadrimaculatus* by feeding on ducks infected with *P. lophurae*. Of 29 fed 7 were positive for oöcysts and one for sporozoites but transmission has not yet been proved. The importance to human malaria is that oöcyst and sporozoite indices in *A. quadrimaculatus* are studied and it appears therefore that some method of distinguishing between human and avian infections of this mosquito [and perhaps others] should be attempted

C II

HURLBUT (Herbert S) First Instar Characters for distinguishing the Common Inland Species of Anophelines of Eastern United States.—*Amer J Hyg* 1941 July Vol. 34 No 1 Sect. C pp 47-48. With 9 figs on 1 plate

VARGAS (L) New Variety of *Anopheles pseudopunctipennis* (Diptera Culicidae).—*Bull Brooklyn Ent Soc* Brooklyn NY 1941 Apr Vol 36 No 2 pp 73-74
—*Anopheles pseudopunctipennis willardi* n. var (Dipt. Culicidae)
—*Rev Soc Mex Hist Nat Mexico DF* 1941 June Vol. 2 No 1 pp 47-49 [In Spanish] [Summarized in *Rev Applied Entom Ser B* 1941 Nov Vol. 29 Pt 11 pp 172-173]

In the first paper it is stated that the extensive distribution of *Anopheles pseudopunctipennis* Theo which occurs sporadically from the western United States to northern Argentina and the fact that it is considered a dangerous vector of malaria in some regions but not in others led to the theory that it might include varieties differing in ability to transmit the disease. From a study of the morphology of the eggs the author distinguishes four varieties. In addition to the typical one these are *boydi*, Vargas *franciscanus* McCracken and *willardi* var n. Characters distinguishing the eggs of the four varieties and the larva and adults of both sexes of var *willardi* are briefly described. It was found to occur over an area of about 60 sq miles in the State of Chihuahua Mexico and was the only *Anopheles* taken in July and August 1940. The adults of both sexes enter houses and stables and the larvae are found in sunlit pools and streams.

The second paper contains substantially the same information but the notes on the distribution of *A. pseudopunctipennis* and the larval characters of the new variety are somewhat more detailed and the morphological characters of the eggs of the four varieties are shown in a table.

Tropical Diseases Bulletin.

VARGAS (Luis) Nota sobre los huevecillos de Anopheles mexicanos.
[The Eggs of Mexican Anopheles.]—Reprinted from *Gac Med de Mexico* 1941 pp 107-123 With 12 figs. [17 refs.]
English summary

The proper identification of malaria vectors is indispensable in the epidemiological studies of the disease and the eggs in some circumstances allow the distinction not only of species but also of varieties.

The author details the manner by which the eggs were obtained, the nomenclature of the structures and gives the key for the species. He discusses also the evolution lines of *paratoponictipennis*, *abroadi*, *immaculatus*, *albipennis*, *darlingi* and *oswaldi*.

KCCM (Henry W) The Eggs of Some Costa Rican Anopheles.—
Amer J Trop Med 1941 Jan Vol 21 No 1 pp. 81-102.
With 4 plates [14 refs.]

The eggs of nine of the commoner Costa Rican anopheles were studied. Four had been known previously from reports published from other countries. The remaining five species the eggs of which are here described for the first time, include *Anopheles anomalocephalus*, *A. apicimaculis*, *A. neomaculipalpis*, *A. punctimaculis* and *A. vestitipennis*. About thirty photomicrographs were taken of dorsal, lateral and ventral views of ova and nearly fourteen hundred eggs were measured. The longest eggs were those of *A. neomaculipalpis* and the shortest those of *A. abroadi*. There was evidence that the eggs of *A. albipennis* laid at the beginning of the dry season were any larger than those deposited during the preceding rainy months. Variations were found in the ova secured from *punctimaculis* and *A. vestitipennis*. Such variations occurred at the same time in a batch of eggs laid by a single female mosquito. The real significance of the different types of eggs laid by apparently identical female anopheles is not yet clear though it is possible that these variations may be seasonal like the *A. walkeri* observed by Hurst.

KCCM (Henry W) & RAY (L. M.) Observations on the Anopheles of British Honduras.—
Amer J Trop Med 1941 July Vol. 21 No 4 pp 559-569 With 1 map

The paper deals with the Anopheles of British Honduras and the relation of the species to the transmission of malaria. It will be remembered that *Anopheles darlingi* has been recognized for some years as an important carrier of malaria in parts of Brazil, Guiana and Venezuela. Until 1940 it was supposed that its distribution was limited to that well-defined area but in that year it was discovered the authors find that *A. darlingi* occurs in rural areas, but not immediately on the sea coast. It frequents houses and is evidently a vector of malaria among 114 dissected, sporozoites were found in the salivary glands of one. It is also reported that *A. vestitipennis* transmits the infection. In all nine species of anopheles were found in British Honduras of which *A. albipennis* is the most abundant and widely distributed.

P. A. Buxton

RAMOS (A da Silva) & UNTE (Ovidio) Notas sobre os anofelinos de São Vicente e suas imediações. [The Anophelines of S Vicentia.]—*Ann Paulist Med e Cirurg* 1941 Apr Vol 41 No 4 pp 303-6 309-14 With 1 fig English summary

The authors report the data they obtained on the *Anopheles* from S Vicente (Est S Paulo-Brasil) and its environments an endemic malarial region.

"They refer to the chemical conditions of the breeding places where the pH of the water was 6.0 to 6.4 and 7.2 to 7.4 and also to the eggs of *A. oswaldoi* var *oswaldoi*, *A. intermedius* and *A. mediopunctatus*

SARKAR (S K.) Two Fatal Cases of Cardiac Malaria.—*Indian Med Gaz* 1941 Feb Vol. 76 No 2 p 93

The author describes two fatal cases of *P. falciparum* malaria one of a young man aged 16 the other of a woman aged 60 Both of these patients developed symptoms of acute cardiac failure quite early in acute attacks of malaria and both died within a few hours of the onset of cardiac symptoms. In neither case was there any evidence of organic heart disease before the attack of malaria. N W

CHATTERJEE (P K) A Case of 'Raynaud's Phenomenon.'—*Calcutta Med JI* 1941 Apr Vol. 38 No 4 pp 187-190 With 2 figs. on 1 plate

A Hindu female aged 16 suffered from symmetrical cyanosis of fingers and toes. The patient came from an endemic malarial area. Five months previously she had been very ill and had passed black coloured urine a diagnosis of blackwater fever had been made Gangrene involved all the finger tips. After three weeks in hospital the cyanosis disappeared. The author discusses Raynaud's disease and the various conditions in which Raynaud's phenomenon, symmetrical peripheral cyanosis with, or without gangrene may occur He considers that chronic malaria and blackwater fever were important predisposing causes in the case he reports N W

JOURNAL OF THE ASSOCIATION OF MEDICAL WOMEN IN INDIA. 1941 May Vol 29 No 2 pp 92 94-97 —Two Cases of Cerebral Malaria associated with Pregnancy

A woman eight months pregnant was admitted to hospital suffering from vomiting and oedema of the legs. There was no albuminuria. She left hospital after four days stay and was readmitted two days later unconscious she had had seven fits on the morning of her readmission. Her urine then contained albumen She died the following day A partial post-mortem examination was made The liver showed none of the changes usually seen in eclampsia There was a large amount of malarial pigment in the tissues of the placenta, and ring forms of *Plasmodia* were seen in the red cells in the maternal sinuses of the placenta. Most of the speakers at the clinical meeting to which the case was reported appeared to think that death was caused by cerebral malaria

The second case was that of a woman in the 8th month of pregnancy who was admitted to hospital in a low dazed condition there was no

fever. After a short period of violent delirium she died. Post mortem examination showed large numbers of malaria parasites in the capillaries of the brain. Examination of the liver excluded eclampsia as a cause of death. N II

HITAGAWA (M) & VAZQUEZ-COLET (Ana) Observations on the Protein Tyrosin Reaction as a Diagnostic Test for Malaria.—*Acta Med Philippina* 1941 Jan.-Mar Vol. 2 No. 3. pp 355-365

Using the method devised by PROSKE and WATSON [see this *Bulletin* 1939 Vol. 36 p. 813] the authors applied the protein-tyrosin serodiagnostic test to the sera of 1,872 individuals, of whom 1,491 were normal individuals, 239 were non-malarious patients whose sera gave positive syphilis reactions, and 142 were suffering from malaria. The tyrosin index for euglobulin was below 80 in 99 per cent. of normal cases and below 45 in 83 per cent. In sera from malaria patients the tyrosin index ranged from 80 to 240—it was indicative of malaria (above 85) in 84.5 per cent. of known malaria cases. Only 20 per cent. of syphilitic malaria free sera gave tyrosin indices higher than 80. *P. vivax* infections gave the highest reactions. Chronic malaria cases gave higher tyrosin indices than acute cases. N II

So (Kunza) Zum Klinischen Studium der Leberfunktion mit Azorubin-S-Methode III Mitt. Ueber die Störung der Leberfunktion bei Malaria [Liver Damage in Malaria].—*Taiwan Igakkai Zasshi* (*Jl Med Assoc Formosa*) 1941 Apr Vol. 40 No. 4. [In Japanese pp. 730-747 With 2 figs [22 refs.] German summary pp. 747-748.]

The author estimates liver damage by the Azorubin S test in which 2 cc. of a 1 per cent. solution of the dye are injected intravenously and thereafter the amount in the urine is estimated colorimetrically at various intervals. In malaria the excretion is increased over the normal and is parallel with the increase in urobilin in the urine. This is taken as an indication of liver damage and is especially marked in the febrile period of the disease and is more marked in subtertian than in benign tertian infections. There is no correlation between this test and the Takata reaction. Figures of the cases investigated are given. C II

RIX (Senshu) Ueber Urobilin- und Indicanausscheidung in Harn bei Malaria. [The Urinary Excretion of Urobilin and Indican in Malaria].—*Taiwan Igakkai Zasshi* (*Jl Med Assoc Formosa*) 1941 Apr Vol. 40 No. 4. [In Japanese pp. 777-782 German summary pp. 782-783.]

In acute malaria urobilin or urobilinogen was found in the urine in 60 to 74.1 per cent. of cases, in chronic malaria in 12 to 58 per cent. being more common in subtertian than in benign tertian cases. Indican however is found more frequently in latent or chronic cases (35.2 to 41.1 per cent.) than in acute (14.7 to 36.9 per cent.) but shows a distinct correlation with malaria. C II

- So (Kinza) Ueber die Nierenstörungen bei Malaria [Ronal
Damage in Malaria.]—*Tansan Igakka Zassi (Jl Med Assoc
Formosa)* 1941 June Vol 40 No 6 [In Japanese pp
1040-1047 [27 refs] German summary pp 1047-1048.]

The author has found albuminuria in acute subtertian malaria in 64.9 per cent of cases during febrile periods and in 63.2 per cent. during intervals in acute benign tertian 41.2 and 12.5 per cent. respectively and in chronic cases in 30.2 per cent. In addition 3 cases of acute nephritis were found in 97 cases. The concentration power of the kidney was intact and the phenol sulphonephthalein test normal. Excretion of salt was generally increased in the febrile period and decreased during the fever free period. [See also this *Bulletin* 1930 Vol 27 pp 508-651 1931 Vol 28 pp 131-998 1933 Vol 30 pp 75-97-499 1934 Vol 31 p 426 for the special association of nephritis with *quartan* malaria]

- OESTERLIN (Manfred) Blutzuckerspiegel und Malaria. Eine chemo-therapeutische Studie [Blood Sugar and Malaria a Chemo-therapeutic Study]—*Arquivos do Inst Biol São Paulo* 1940 Vol 11 pp 333-337 [17 refs]

This is a review of the work of many authors on the effect of a number of chemicals (synthalin and allied substances diguanidine undecane diamidine and others) on animal trypanosomiasis and on bird malaria. Though some of these drugs have the effect of reducing the blood sugar the author concludes that their beneficial actions in trypanosomiasis and malaria are not due to this but are the result of direct effect on the parasites. [There is nothing new in this conclusion.] C II

- RAO (V Venkat) The Effect of stocking Rice Fields with Sullage at Khurda Road on Anopheline Breeding—*Indian Med Gaz* 1941 Feb Vol 76 No 2 pp 86-88

In the vicinity of the Khurda Road railway colony in Orissa rice fields are almost the only breeding places of the local anopheline vectors. The sullage from this community of about 3500 persons passes through a kutchia drain through numerous rice-fields to the Daya River. One rice-field near the outfall was selected for experiment a similar field serving as control. Once a week in the dry season from March to June sullage was allowed to flow into the experimental field till it reached a depth of about half an inch. Usually the field became dry in 24 to 36 hours and thus prevented the breeding of *C fatigans*. The field was ploughed when dry about once a month during this period. At the beginning of the rains rice seed was broadcast rice is not transplanted in this part of Orissa. Thereafter the field was three inches deep. The crop is entirely dependent on rain water. From July 1st to December 31st larval sampling was done once a week in the treated and in the control fields. The total numbers of Anopheles larvae collected during this period were—in the sullage treated field *A. subpictus* 275 *A. vagus* 176 *A. culicifacies* 1 and *A. annularis* 2 in the control field *A. barbirostris* 21 *A. hyrcanus* 117 *A. subpictus* 175 *A. vagus* 83 *A. culicifacies* 27 *A. annularis* 139 *A. aconitus* 70 and *A. varuna* 7. *A. annularis* is the chief vector in the Orissa coastal

plain. Thus it would seem from this first experiment that the treating of a rice-field with sullage greatly decreased the breeding of vector species while it increased the breeding of less harmful species. *N W*

RUSSELL (Paul F) MULLIGAN (H. W.) & MOHAN (Badri Nath)
Specific Agglutinogenic Properties of Inactivated Sporozoites of
P. gallinaceum.—*Jl Malaria Ind of India* 1941 June.
Vol 4 No. 1 pp. 15-24

The authors have shown that the sporozoites of *Plasmodium gallinaceum* dissected from the salivary glands of experimentally infected mosquitoes (*Aedes albopictus* *Anopheles obsoletus* *Anopheles kishinouyei*) may be completely inactivated by exposure in saline solution to ultra violet radiations. Such inactivated sporozoites, though incapable of producing infections when injected into fowls will, however stimulate the production of agglutinins. The serum of such fowls will agglutinate sporozoites freshly dissected from infected salivary glands. In no case after repeated injections of sporozoites was the agglutination titre of the serum less than 1/4 096 while in one case it was 1/262,144. These titres are considerably higher than those given by the sera of fowls which have recovered from acute infections.
C M Wrenon

MULLIGAN (H. W.) RUSSELL (Paul F) & MOHAN (Badri Nath)
Active Immunization of Fowls against *Plasmodium gallinaceum* by
Injections of Killed Homologous Sporozoites.—*Jl Malaria Ind of India* 1941 June Vol 4 No. 1 pp 25-34 [29 refs.]

The authors review the various attempts which have been made by other workers to produce active immunity to malarial infections in monkeys and birds by different vaccination procedures. They then discuss their own attempts to vaccinate fowls against *Plasmodium gallinaceum* infections. As a vaccine the inactivated sporozoites mentioned in the paper reviewed above were employed. It was there shown that repeated injections of such sporozoites caused the appearance in the blood of specific agglutinins. The present paper describes the testing of the susceptibility of these fowls to mosquito transmission of the parasite. It was found that in all cases infections occurred as readily as in unvaccinated fowls but that the pathogenic effect of these infections varied with the agglutination titre of the serum. If the titre was 1/16 000 or less the pathogenic effect was the same as in normal fowls and was associated with a mortality of 50 per cent., whereas with a titre of 1/32,000 or more the infections were very mild with no mortality whatever.
C M W

PLAGUE.

BOMBAY ANNUAL REPORT OF THE HAFFKINE INSTITUTE FOR 1939
[SOKHEY (S. S.) Director]. pp 3-6 33-43 —[Studies on Plague.]

In the general review of the work of the Haffkine Institute reference is made as usual to the large quantities of plague prophylactic vaccine 2,867,527 cc., produced during the year. Much work has been done on

the optimum conditions of yield of this vaccine and also on its antigenic characters. At the same time it is evident that intensive researches are being carried out on the chemotherapy of plague which beget the hope that an effective remedy for bubonic plague is within sight. Field trials in human cases of antiplague serum sulphapyridine and sulphathiazole have already been made. It is contended that a truer picture of the results is given when only those cases are taken into account in which septicaemia was present at the time the treatment was started. Case mortalities although reckoned on a very small number of cases were for antiplague serum, sulphapyridine, sulphathiazole and ordinary iodine treatment 60.6, 43.3, 41.8 and 95 per cent respectively. Here both sulphathiazole and sulphapyridine have much the same curative effect. In mouse infections however sulphathiazole proved by far the more effective and saved 80 per cent as against 10 per cent. In the human trials the dosage is considered to have been inadequate although still remarkable. There is little doubt that sulphonamide drugs administered by the mouth have the advantage over serum of being comparatively cheap and of not deteriorating with storage.

In Part II of the report research work is taken up in greater detail —

I *Plague vaccine*—Optimal temperatures for the growth of *P. pestis* in broth are 27° to 29°C while growth at 38°C is very poor. Much work is being done to differentiate between broth and agar grown vaccines and indicates that only the clear fluid of broth vaccines grown at 27°C or the clear fluid from suspensions of agar growths incubated at 37°C should be used.

II *Field trial of antiplague serum*—This refers to the comparison of serum with sulphonamide compounds.

III *Chemotherapy of plague*—A study was made of six out of 35 synthesized compounds particularly heterocyclic derivatives of sulphanilamide. Trials of sulphapyridine and sulphathiazole made on infection in mice proved that sulphathiazole was possessed of remarkable curative action.

IV *Epidemiology of plague*—From 1931 to 1936 a steady reduction in the susceptibility of Bombay rats has been noticed as may be seen from the numbers found plague infected—748, 600, 393, 34, 0 and 0 respectively out of a total of 200,000 to 300,000 animals examined yearly. The susceptibility is on the increase again. This can be measured by the use of the standard infective dose in batches of rats. Percentage mortality had declined from 9.3 to 0 between 1931 and 1936.

V *Serological strains of P. pestis*—No serological differences were found between even the virulent and avirulent forms of *P. pestis* although the type of agglutination differed according as the organism was grown at 27°C or 37°C.

VI *A serological test diagnostic of plague in rodents*—The test was one of agglutination of organisms contained in suspensions of either liver or spleen of rodents dead of plague. This test was efficient even if the organs had become putrid, and is likely to be useful. The serum to be utilised for the test must be one prepared against a 37°C growth of *P. pestis* and agglutination controls to be set up at the same time are (1) normal saline, (2) normal rat spleen suspension, (3) normal rabbit serum and (4) 1-4 dilution of 5-week broth culture at 37°C.

[May 1942]

VII *Study of virulent and avirulent strains*—In these investigations confined to the strains 120/3 H virulent and avirulent various points in the morphology of colonies, morphology of organisms, type of growth, stability in broth and presence of a soluble substance were studied. "The soluble substance contents of the strains seemed to show some correlation with their antigenic values."

VIII *The metabolism of the plague bacillus*.—"Three aminoacids—proline, phenylalanine and cystine—are necessary for growth in chemically defined medium while "more complex growth factors such as thiamin, nicotinic acid, etc. are not indispensable. The latter factors seemed to have a stimulatory effect on the growth of the organism."

IX *Effects of temperature and humidity on the growth of early stage of the three Indian rat fleas*—The fleas were *Xenopsylla cheopis* Y, *atra* and *X. brasiliensis*. It was found that the effective range of humidity for larvae varies according to temperature and this range is wider at 27°C and gradually narrows down with departure from this temperature. Excessive moisture is not itself inimical to the growth of either larvae or pupae but acts by forming a crust on the surface of the soil impermeable to air. Larvae and pupae die of suffocation.

W F Harvey

GALE (G W) An Outbreak of Pneumonic Plague in the Kalahari.—
South African Med J 1941 Oct 11 Vol. 15, No. 19
pp 369-373

Mixed bubonic and pneumonic outbreaks have occurred in South Africa since the first recorded case of plague in 1899. The incidence of the pneumonic form has been fairly high and in the present epidemic involving 37 persons all cases except one were pneumonic. The single case of bubonic type was one of infection contracted from a pneumonic case. All but one of the 37 persons died and the only escape was the last of the series. All the victims were natives "living in or adjacent to the Morokwen Reserve in the Kalahari 100 miles north west of Vryburg. One or two points of interest are illustrated in this small epidemic: (1) the intimation of the suspected nature of the outbreak by the police; (2) the transmission of infection from village to village through the medium of persons visiting the sick and contracting the disease; (3) the paucity of cases of infection in spite of close contacts; (4) the inability of the native whose belief in magic is profound, to understand the simplest explanation of plague action; (5) the cooperative spirit of the native with the health authorities in spite of his ignorance and (6) the short duration of the outbreak.

Vaccination was adopted as a control measure in single doses of 1 000 million organisms. It was willingly accepted by the native as a purely magical procedure. In any case "the great majority of the 1 000 persons vaccinated at Morokwen were never exposed to any real risk but the vaccination did much to allay the tendency to panic.

The origin of the outbreak is somewhat doubtful but it is thought to have been due to either the springhare (*Pedetes capifer*) or the multi mammary mouse (*Mastomys natalensis*).

W F H

CREEL (R. H.) *Plague Situation in the Western United States.*—*Amer Jt Public Health* 1941 Nov Vol 31 No 11 pp 1155-1162 With 3 maps

Many publications have appeared in recent years describing the entry and spread of plague in America. The present account by the Medical Director in charge U.S. Public Health Service San Francisco is a trenchant criticism of the lack of energy, and of the apathy which has led to the spread of plague in forty years throughout ten western States. California has been the only exception. Otherwise none of the 10 western States has made any serious attempt to eradicate plague infection in wild rodents. Such efforts as were made might have succeeded in California in the complete extermination of plague had they been reasonably continuous. An undue optimism over the results obtained led to curtailment of funds and reinfection of rodents especially of ground squirrels made fresh appearances. This extension of plague through the ground squirrel population has been slow taking for example 25 years travelling from the Bay Area to Kern and Modoc counties.

Most interesting are the recommendations and warnings made to meet the present situation. (1) Plague infection in the western States can be exterminated in five years at an expenditure of 2 500 000 dollars. (2) Plague unless controlled may be expected to extend into any city which possesses a sufficiently large rat population. (3) Laboratory examination of rodents is essential and must be continuous.

Negative findings over a period of two years or seasons provided that an adequate supply of rodents has been examined should be an acceptable standard of eradication. (4) The main reservoir of plague is probably in ground squirrels and it should not be necessary to conduct a campaign of extermination against all wild rodents. Eradication amongst squirrels will be followed by spontaneous disappearance in such species as the chipmunk the marmot wood rat prairie dog and other groups which do not have the density of population essential for the maintenance of an enzootic reservoir. (5) There is reason to believe that the infection will spread to the rodents of the Great Plains and into the Mississippi Valley and Eastern United States.

W F H

PUBLIC HEALTH REPORTS 1941 July 25 Vol. 56 No 30 pp 1520-1521—*Plague Infection in North Dakota and Canada.*

In this note it is pointed out that in N Dakota plague has been found for the first time in fleas from ground squirrels. This is believed to be the furthest east sylvatic plague has been reported in the United States. In New Mexico plague has been found, for the first time in a kangaroo rat. In south-east Alberta there is an area covering 144 square miles in which plague infection of rodents and their fleas has been demonstrated. Further investigations are in progress. C W

MOLL (Aristides A.) & O'LEARY (Shirley Baughman) *Plague in the Americas an Historical and Quasi-Epidemiological Survey*—*Bol Oficina Sanitaria Panamericana* 1941 Mar-Apr-July & Nov Vol 20 Nos 3 4 7 & 11 pp 254-262 385-374 697-714 1148-1155 With 3 maps & 2 graphs. [Refs. in footnotes]

VI *Ecuador*—The last of the Pacific coast countries to be invaded by plague was Ecuador. At the present time plague has apparently

[May 1942]

been eradicated from ports and lowland towns but persists in some mountain areas. It was in 1908 that a rat epizootic broke out in Guayaquil and the prediction that human cases would certainly follow was fulfilled. Plague persisted in Guayaquil until 1930 when it disappeared after an energetic anti-rat campaign. The disease spread along the Guayaquil railroad and from its stations to other parts of the country. In most of the railroad towns plague developed as a rat epizootic followed by human plague. *Y. cholerae* is taken to have been the vector flea concerned. While this was so for railroad towns the disease appeared elsewhere "to have little connection with either rats or *ekopis*. In mountainous regions especially where the natives live under poor hygienic conditions, use the same garments night and day and sleep on the floor it is the gumeapigs (*cu cobero*) which may precede epidemics without any indication of rat mortality or even in the absence of rats altogether. One specially interesting observation was of great mortality among monkeys (*monos*) from time to time in the Alamor area preceded by gland swellings in the dead monkeys."

Indians in Ecuador raise gumeapigs for food, keep them in their own habitations eat animals found dead, crowd together at wakes and kill vermin (lice and fleas) with the teeth. Such customs have a definite importance in plague epidemiology and the last mentioned "believed to be the cause of the tonsillar form of plague." Epizootics of plague were found among wild rabbits in Chumborom. Although *ekopis* appears to be acknowledged as the chief plague flea it is believed that *P. irritans* the human flea is the chief transmitting factor in those localities in which no *ekopis* is found.

"Despite the complete lack of hygiene the living in close contact with all kinds of animals (pigs gumeapigs rabbits) the heavy infestation with lice and fleas and the crowding together on occasion the plague morbidity both pneumonic and bubonic has been low in the Ecuadorian mountains and the disease is really more endemic than epidemic."

VII. Peru.—While Ecuador was the last country of the West coast of South America to be attacked by plague Peru was the first. None of the coastal departments of Peru has escaped the infection. The disease appeared in 1903 and attacked Pisco and Callao at almost the same time. It is not certain how plague was brought to Peru. The persistence of plague has been due chiefly to the rat, and ENRY has said "there is no doubt that the extent of the rat infestation of buildings has determined the morbidity of plague in the different communities from North to South in Peru regardless of differences in climatic conditions." "An important focus of Peruvian plague has been the hacienda an agricultural community or small village of from 50 to 200 persons." "No sylvatic plague has been reported and most of the human plague has been bubonic less than 3 per cent has been pneumonic. With the adoption of active antiplague measures in 1930 the incidence of plague dropped greatly."

VIII. Paraguay.—Paraguay was the first of the American countries in which the presence of bubonic plague was reported. Plague was brought to America in the Argentine coasting steamer *Centinero* in April 1909 although it is possible that the steamer may have left infection in ports of the Argentine before reaching Asuncion. The whole story of the first arrival of plague is a little complicated.

Considerable reluctance was shown by the populace to admit the existence of plague as was the case elsewhere also. The first epidemic was the severest and some 15 outbreaks of limited character have occurred since 1900. The last of these to be recorded was one of 9 cases in 1928. Paraguay has adopted the antiplague measures recommended in an International Sanitary Convention entered into with neighbouring Republics in 1904 and those of the Pan American Sanitary Code.

W F H

[For earlier reports in this series see this *Bulletin* 1941 Vol. 38 pp 321-625]

LOBO (Martin M) & SILVETTI (Luis M) Peste rural Brote epidemico-epizootico del año 1940 en la provincia de Tucumán [Rural Plague Epidemic and Epizootic of 1940 in the Province of Tucumán.]—*Semana Méd* 1941 July 31 Vol. 48 No 31 pp 262-276 With 1 map & 6 figs.

Tucumán a province of the Argentine Republic suffered from a major outbreak of plague in 1940. It was both epidemic and epizootic and affected a large extent of plains territory stopping only at the foot hills of the mountain region. Another feature of the outbreak was its long duration from April to the end of the year. Thirty-six cases of human plague 24 bacteriologically confirmed were recorded of which 23 were fatal. This however was not a true total for the inhabitants in order to avoid sanitary intervention concealed cases of plague. There seems to be no doubt that human infection was of sylvatic rodent origin and occurred even in the absence of rats. These infections took place far from urban centres and in places distant from one another. The epizootic however was widespread and undoubtedly sylvatic. Positively infected rodents were *Craomys R alexandrinus* vizcachas (Peruvian hares, *Lagostomus maximus*) and possibly weasels. Isolation of the plague bacillus could be always made by culture or by guinea-pig inoculation with bone marrow obtained in human beings from the second or third phalanx of a finger. Although the organisms were present in pure culture direct smear from the bone marrow was not a certain method of diagnosis for the bacilli were sparse. The fleas identified were *Xenopsylla cheopis* on *Rattus alexandrinus* *Craneopsylla wolfschlegelii* and *Rhopalopsyllus byturis* on *Craomys griseoflavus* and on *Microcavia australis*. Serotherapy was the treatment favoured by the authors but they had small opinion of vaccine or serum prophylaxis. The doses of serum used in treatment were 100 cc daily in adults as long as required and up to 50 cc. in children.

W F H

DE LA BARRERA (J M) El último brote de peste selvática en Mendoza (1941) [The Last Epidemic of Sylvatic Plague in Mendoza.]—*Rev Inst Bacteriológ* Buenos Aires. 1941 Dec Vol. 10 No 3 pp 390-393 With 3 figs on 2 plates

The infection was of purely sylvatic origin without the intervention of the domestic rat. Three human cases of plague occurred at places distant from one another in the short period 3rd to 13th July 1941 in a district which had previously been visited by plague in 1937 and 1939. In all three cases the previous history had been of skinning a hare and the development of an axillary bubo some days later. These

[May 1942]

hares are hunted with difficulty and when as in these three cases, they were hunted with dogs it is only the very young or sick hares which are caught. The three cases of human plague had been preceded by an epizootic among field rodents and abundant evidence was still forthcoming to establish the bacteriological diagnosis of plague. All these facts combined serve to prove that the human cases were due to hares infected with plague.

- MACCHIAVILLO (Atilio) Some Special Epidemiological and Clinical Features of Plague in Northeastern Brazil.—*Public Health Rep* 1941 Aug 15 Vol 58, No 33 pp. 1657-1681
[Already abstracted from the Spanish text, of which this article is a summary See this Bulletin 1941 Vol 38 p 624] W F H

- BUXTON (P A.) The Recorded Distribution of Certain Fleas.—*Bull Entom Res* 1941 Aug Vol 32 Pt 2 pp 119-122. With 1 fig.
The world distribution of *Xenopsylla cheopis* *X. astia* *X. brasiliensis* *Nomophyllus fasciatus* and *Pulex irritans* is set out in 5 maps with some explanatory matter relating to the selection of data from the literature. C IV

- HOLLAND (G P) A Survey of the Rat Fleas of the Southern British Columbia Coast with Relation to Plague Studies.—*Proc Ent Soc B C Vernon* BC 1941 No 37 pp 1-8 [Summarized in *Rev Applied Entom Ser B* 1941 Oct Vol 29 Pt 10 p 168]

A survey of the fleas on rats and mice in the cities of Vancouver and New Westminster British Columbia, was made between 28th August and 27th November 1939. The records for Vancouver are divided into those from garbage dumps and those from the waterfront, but as differences in infestations in the different areas of New Westminster were slight only total results are given. *Mus (Rattus) norvegicus* represented 94.4 per cent of the rodents taken. At the city dump at Vancouver 725 rats of this species were taken. At the waterfront 1 403 fleas, comprising 1,021 examples of *Xenopsylla cheopis* Roths 358 of *Ceratophyllus (Nomophyllus) fasciatus* Bosc, and 24 of the genus *Ctenocephalides* at the waterfront areas the corresponding figures were 516 615 2 611 and 2. At another dump 115 rats of this species were virtually free from fleas only 7 individuals of *Ceratophyllus fasciatus* being found on them. At New Westminster 69 were harbouring 52 fleas 16 *X. cheopis* and 36 *C. fasciatus*. In addition, 7 individuals of *M. (R.) rattus alexandrinus* 1 of *M. (R.) rattus* and 68 mice (*Mus musculus*) were taken in Vancouver and yielded respectively 7 1 and 3 fleas all of which were *C. fasciatus*. The sex ratios in the flea populations studied are shown in a table. It is pointed out that as most of the rats were trapped the figures given here are conservative ones. Two groups of rats that were shot had "The rodents were carefully examined for lesions of the liver or spleen or enlarged lymph glands that might indicate the presence of

plague and almost all fleas were kept for inoculation tests. Plague has not yet been found in British Columbia, but the large and apparently increasing rat population and abundant fleas constitute an important potential reservoir particularly in view of the high *cheopis* index in some areas.

RUNNER (A. G.) Occurrence of the Oriental Rat Flea in Columbus, Ohio.—*Science* 1941 Jan 31 Vol 93 No 2405 pp 111-112

Xenopsylla cheopis was originally only to be found in seaports of the United States but it is now known to occur in the interior and has been reported as permanently established at Ames, Iowa. The author now records the finding of 51 specimens on 18 rats caught in the residential section of Columbus Ohio no other species was seen. The flea, therefore appears to be established there. [See also this *Bulletin* 1941 Vol 38 p 623] C II

WHEELER (C. M.) DOUGLAS (J. R.) & EVANS (F. C.) The Role of the Burrowing Owl and the Sticktight Flea in the Spread of Plague.—*Science* 1941 Dec. 12 Vol. 94 No 2450 pp 560-561

Plague was found in ground squirrels (*Citellus beecheyi*) in California, and the flea *Echidnophaga gallinacea* is a parasite of these rodents. It has a very wide distribution and attacks many hosts including the burrowing owl (*Speotyto cunicularia*). The association between these owls and ground squirrels is well known. Mass inoculation of fleas taken from one owl showed that they harboured *P. pestis* but it is thought that this species of owl is immune. It is evident however that the transport of infected fleas from rodents by owls is possible. The vector efficiency of the fleas is now being studied. C II

- i. RALL (Yu. M.) FLEGONTOVA (A. A.) & SHEIKINA (M. V.) [Notes on the Biology of the Little Ground Squirrel (*Citellus pygmaeus* Pall.) in Plague Endemic and Plague-free Areas of West Kazakhstan.]—*Rev. Microbiol. Epidemiol. et Parasit.* Saratov 1929 Vol. 12 No 2 pp 139-150
- ii. KALABUKHOV (N. I.) [Dispersal of the Ground Squirrel (*Citellus pygmaeus* Pall.) as a Cause of Plague Epizootic.]—*Ber. Mikrobiol. Staatssnst. Rostov* 1929 Vol. 9 pp 1-7
- iii. ANONYMOUS [Research on the Epizootology of Plague among Ground Squirrels (*Citellus pygmaeus* Pall.) in an Endemic Focus. Results of the Work of the Northern Caucasus Anti Plague Organisation, 1926-35.]—*Rev. Microbiol. Epidemiol. et Parasit.* Saratov 1934 Vol. 13 pp 219-222
- iv. KALABUKHOV (N.) & RAEVSKII (V.) [The Study of Migrations of Ground Squirrels (*Citellus pygmaeus* Pall.) in the Steppe Areas of Northern Caucasus by Means of the Banding Method.]—*Problems of Ecology & Biocenology* 1935 Vol. 2 pp 170-195 With 5 figs.
- v. RALL (Yu. M.) [Some Methods of Ecological Census for Rodents.]—*Problems of Ecology & Biocenology* 1936 Vol. 3 pp 140-157 With 1 fig

- vi FENTUK (B. K.) & SHIRIKINA (M. V.) [A Study of Vole—*Microtus arvalis* Pall. (Mammalia)—Migrations by the Ringing Method.]—*Sci Rep Saratov State Univ* 1938. Vol. 1 (14) Biol. Ser. No 2. pp 85-102 With 2 figs.

These papers are noticed here by title only they may be valuable to students of sylvatic plague and English translations of the papers may be had on application to the Director Bureau of Animal Population University Museum Oxford from whom the price of copies can be ascertained

C 117

- MINISTRY OF AGRICULTURE AND FISHERIES. BULLETIN No 30 pp 14 + 15 With 6 figs. on 4 plates.—Rats and how to exterminate them, with a Note on Grey Squirrels. 1941 London H.M.S.O. [6d]

- GIRARD (G.) Le traitement de l'infection pesteuse par les corps sulfamidés. Peste expérimentale et peste humaine [Treatment of Plague by Sulphonamides, Experimental and Human].—*Bull Soc Path Exot* 1941 Vol. 34 Nos 1-3 pp 37-48.

The present memoir records the completion of work of which a preliminary note has already been published [this *Bulletin* 1939 Vol 38 p 971]. Guinea-pigs were chosen in the experimental work for reasons which are given in full. The mode of infection was to rub the shaven skin with wool soaked in a suspension of infected guinea-pig spleen. In the main two preparations have been tested (1) M. & B 693 (Dagenan) and (2) 1 162 F (Septolix bacteramide). Comparisons are drawn between chemotherapy and serotherapy. Sera prepared in Madagascar with strains of avirulent plague have been used in the treatment of bubonic plague and have given 65 per cent. of recovery. In the guinea-pig M. & B 693 proved more efficacious and less toxic than any of the other sulphonamides tested. The following results are of interest—(1) Only the 693 succeeded in curing such animals (1 out of 2) as were treated 48 hours after infection. No cures, but some prolongation of life were obtained with 1 162 F and with serum. (2) If the curative treatment was started immediately after the infecting dose serum saved the animals but was followed by extensive adenitis and local suppuration while 693 gave only a limited reaction that was quickly absorbed. (3) A cure was obtained with 693 of the pneumonia resulting from intratracheal inoculation in 3 guinea-pigs out of 6, but never with serum. (4) There was no advantage in infecting 693 (Soludagenan) over oral administration. (5) Treatment by 693 had to be prolonged beyond the apparent cure at about the 6th day to 15 days at least in order to avoid fatal relapse. (6) The animals cured with 693 appeared to have developed a certain amount of immunity which enabled them to withstand a new infection 6 to 8 weeks after the first.

In the work on human bubonic plague only 693 and 1 162 F were used. The results were as follows (A) M. & B 693 with 15 cures out of 19 adults treated (1) A dosage of 6, 8 and even 10 gm was administered daily without sign of toxic effect. A reduction in dosage was made as soon as the patient's condition improved. (2) Soludagenan given strictly intramuscularly was well supported and was sometimes given in daily dosage of 2 to 3 ampoules along with 693 by ingestion. (3) Treatment should be continued for 12 days after fall of temperature in daily dosage of 1 to 2 gm. (B) 1 162 F with 9 cures out of 11 cases

which included 4 children out of five. A rather low total dosage of 9 to 25 gm per patient had to be adopted. In some cases serum was combined in the medication.

A total of 37 cases of bubonic plague has been treated with 693 and 1 162 F with or without serum and there have been 9 deaths or 76 per cent of recoveries. No cures have been obtained in human cases of plague pneumonia
W F H

DE VILLAFANE LASTRA (T) SOSA GALLARDO (Juan) & FERNANDO VIDELA (Luis) Tratamiento de la peste de Oriente por medio del sulfanilamido-tiazol. Consideraciones sobre tres casos tratados [Three Cases of Bubonic Plague treated with Sulphathiazole].—*Semana Méd* 1941 May 8 Vol 48 No 19 pp 1073-1079 With 3 charts English summary

In the Province of Córdoba plague broke out in April 1940 and by the following February there had been 105 cases 73 fatal (69.5 per cent fatality) 70 were of the bubonic form 38 dying (54.2 per cent) and 35 of the pneumonic form all fatal

Details are given of three cases treated with sulphathiazole (Cibazol) one came in on the third day of disease the others on the eighth Sulphathiazole was chosen in preference to sulphanilamide and sulphapyridine as being less toxic

The first was a boy of 6 years from an inguinal bubo *P. pestis* was obtained. He was given 4.5 gm of the drug daily for 4 days (this was thought enough for a boy of 6 years) on the fifth day 3 gm. on the sixth 2.5 on the seventh and eighth days 2.0 and on each of the next two days 1.0 gm. These total 29.5 gm [the text says 31.5 gm] without any sign of intolerance. The patient left hospital quite well 14 days after admission.

The second a man of 24 years with temperature of 41°C pulse 120 was excitable and delirious and trying to get out of bed. *P. pestis* was obtained by puncture of a right inguinal gland. He was given 10.5 gm Cibazol daily for 3 days (3 doses of 2.5 gm and 3 of 1.0 gm.) on 4th and 5th days 6 gm. 6th and 7th 4 gm 8th and 9th 2 gm. altogether 55.5 gm. Eleven days after he came to hospital the gland was incised and pus discharged, and the patient left hospital 5 days later

The third was a man of 18 years, with a left inguinal bubo admitted on the second day of illness with a temperature of 40°C pulse 120 somnolent and mentally confused. He too was given 10.5 gm daily for 3 days but 8 gm on the 4th and 5th days and 6 gm. on the 6th day a total of 53.5 gm. [stated as 51.5 gm. in the text] he left hospital 11 days after admission

Further trials are to be made of the prophylactic efficacy of this drug. The authors stress the need (or advantage) of large initial doses in treatment
H H S

BRITISH MEDICAL JOURNAL. 1941 Nov 1 pp 621-622.—Chemotherapy of Plague.

OTTEN (L.) A Live Plague Vaccine and the Results.—*Meded Dienst d Volksgezondheid in Nederl Indië* 1941 Vol 30 No. 1/2 pp 61-110 With 3 charts. [16 refs.]

The use of a live vaccine is a major issue in immunology and Otten has been foremost in his advocacy of the superiority of such a bacteria

[May 16]

vaccine over the more commonly used dead vaccine in plague prophylaxis. Naturally the living organisms of such a vaccine must be avirulent but they must also be truly immunizing for the two characters do not necessarily co-exist. In this full account we have all the important proofs of practicability of production and efficacy set out.

It soon became evident that in testing a plague vaccine experimentally the animal used was of the greatest importance. Any vaccine will protect in some animals such as the white rat, the mouse and the monkey. It is not so with the guineapig and the house rat (*R. rattus norvegicus*) which are difficult to immunize satisfactorily. Here the living vaccine proved its superiority and showed remarkable immunizing power even with the difficult animals. It did not follow however that a good guineapig vaccine was equally effective as a rat vaccine to plague are the most difficult to immunize and are most susceptible and guineapig. Often started his research with a house rat offered by a living vaccine and the fortunate discovery of the strain, kept as usual at 5°C. in deep serum agar stab culture which in 4 months' time was found to have entirely lost its virulence. Does of 5 cc. of a broth culture or a whole agar culture were harmless to house rats and guineapigs. Passage of the strain through rats brought about no change in the non-virulence. But much more important was the finding that this strain possessed high immunizing power for the susceptible animals. The test animals were immunized subcutaneously with a single dose only—from 1-2 agar cultures down to one-millionth or less—and the loss by death from inoculation was under 1 per cent. The infecting dose of the very virulent "Preanger" strain was given 3 weeks later and an 80 per cent. survival of house rats and one of 90 per cent. of guineapigs was obtained.

Investigations were made into the preparation of avirulent strains, which are variants by dissociation obtained by picking off and testing single colonies from stab cultures stored in deep serum agar. It might happen that the first attempt was successful but sometimes success only followed many vain attempts. It did not suffice however to assume that the whole of a stab culture was avirulent. Even the original Tjiridej strain itself may still harbour a few virulent organisms, although in high dilution only avirulent variants could be found on the blood plate. The form of the colony gave no indication whatever of the loss of virulence. When however a single completely avirulent variant colony was obtained the spontaneous loss of virulence was not reversible even under the most favourable colony conditions but single colony isolation is essential for certain.

Other avirulent strains than Tjiridej have been isolated. Tjiridej is a good rat immunizing strain and strain "Soemedjang" a good guineapig immunizing strain. nor does the difference in them may have antigenic differences from one another for example strain two strains appear to be dependent on the greater or less proportion of somatic or envelope antigen present in either. It is interesting to note that the two well known strains now in practical use "Tjiridej" and "E.V." are also rat and guineapig strains respectively. It is thought that man behaves in regard to immunization with any of these rat rather than the guineapig. Immunization with any of these strains as living and dead vaccine respectively brought out a huge

difference in favour of the living vaccine, which is so to speak the main thesis of this article

Plague vaccination in man (1935-1939) has been entirely favourable to the use of the living 'Tjiwidej' vaccine and its use was initiated by a preliminary alternate case testing. In two subdistricts an accurate registration of the entire population was made, family after family and these families were alternately inoculated with live vaccine.

Altogether over 87 000 people were vaccinated. The deaths were all examined by means of spleen and lung puncture. In the course of fully five months 1,207 deaths occurred, among which 265 were in cases of bubonic plague. The results were for 37 435 persons vaccinated, 38 deaths from bubonic plague, and for 44 757 non vaccinated 218 deaths—a reduction in the mortality (1·01 per 1 000 against 4·75 per 1 000) down to almost 20 per cent.

The manufacture of the vaccine follows lines similar to those for killed vaccines—apart from the necessity of inoculating with a strong bacillary suspension instead of with an ordinary broth culture since by the latter method insufficient or too slow growth takes place. The greatest care should however be taken in carrying out the various manipulations with regard to sterility. Still the result of every crop in spite of all precautions remains uncertain and the infection of the concentrated vaccine varies between 0 and 100 per cent. For this reason large quantities have always to be prepared. This has the drawback that on the infection being slight a great stock will still be present after a month which stock has then to be destroyed—an uneconomical method of working which is however not to be avoided, since otherwise there is a risk of shortage of vaccine through possible mishaps.

W F H

PIRIE (J H Harvey) & GRASSET (E.) A Comparison of the Antigenic Qualities of Certain Strains of Avirulent *B. pestis*—*South African Med J* 1941 July 28 Vol. 15 No 14 pp 275-276

The authors have already shown that live avirulent plague bacilli are more efficacious than dead virulent organisms in producing immunity to *P. pestis* in black rats and in furnishing potent antiserum in horses. In the present article a comparison has been made between a number of avirulent strains from different sources as regards protective immunization and the preparation of antisera. These strains were the Madagascar E.V. 76 Otten's Tjiwidej rough (T.W.R.) a South African strain 2 of 1904 and K 120 a strain selected by Rowland some 27 years ago. The results are given as follows—(1) T.W.R. 2 and K 120 appear to be about equal in immunizing quality with E.V. 76 rather behind them in order and (2)

There is no substantial difference seen between the two sera: 12 out of the 24 rats treated with the E.V. 76 serum surviving and 13 out of 24 in the case of the T.W.R. serum.

W F H

GRASSET (E.) Live Plague Vaccine as a Prophylactic against Plague.—*South African Med J* 1941 Oct 11 Vol 15 No 19 pp 373-375

Most of this article deals with the precautions adopted in the preparation and use of live plague vaccine. The two strains used were the E.V. strain of Madagascar and the Tjiwidej strain of Java. It will

[May 194

be remembered that the former strain is more protective to guineapigs and the latter to wild rats. As it is not definitely known what the human response is to these two immunological types it was decided to use a mixture of the two types in single dose of 1 000 million organisms.

No signs of reversion to their original virulence have been noticed during the past years in any of these strains and it seems that the danger is not of acquisition of virulence but loss of the remarkably good immunizing power possessed by these strains. The good antigenic power of the vaccine and its virulence for guineapigs (subcutaneous injection of 4 000 to 20 000 million organisms) are tested before issue. The product of culture and test "is stored in the ice chest and issued from the fifth to the fifteenth day following its preparation. Local reaction after injection of the full 1 000 million dose was only a moderate swelling and the temperature usually remained normal. Field trials of the vaccine have already begun

W F H

GRASSET (E) *Plague Immunisation with Live Vaccine in South Africa*.—*Trans Roy Soc Trop Med & Hyg* 1942 Jan. ; Vol. 35 No 4 pp 203-211 [11 refs]

Immunisation with living vaccine is receiving much support in South Africa joins Madagascar and Java in the use of this vaccine in the field. The vaccine suspension consisted of a 24-hour agar growth at 37°C adjusted to a concentration of 1 000 million organisms per cc and made from the combined E V and Tyndale strains. The dose was a single injection of 1 000 million organisms. Local reaction was slight and general reactions were exceptional and moderate. A great deal of care has of course to be taken in the preparation of the vaccine which requires bacteriological tests for purity and animal control. A beginning has been made to use this vaccine in human beings as it has many advantages: single injection allowing of mass inoculation in much shorter time comparatively little reaction and coming in due course for these human inoculations, although "the plague problem in South Africa has not the same importance as in plague endemic countries such as Madagascar, Java or India."

W F H

DONOVAN (Anthony) & HOPKINS (E D) *El lanzamiento en la lucha antipestosa. Descripción del nuevo método eficaz contra roedores y pulgas de roedores* [The Use of Flame Throwers in Plague Control].—*Bolet Oficina Sanitaria Panamericana* 1941 Oct. Vol. 20 No 10 pp 1007-1015 With 7 figs English summary

At the present time there are three principal means of combatting bubonic plague: rat proofing effective but not always practicable vaccination which is generally considered relatively ineffective and which does not eliminate the infection from its rat reservoir and rodent destruction, accomplished by poisoning, trapping shooting, clubbing poison gases, destruction of nests and burrows, and use of animals such as cats dogs and ferrets. In the course of the anti-plague campaigns in Peru a new method of rodent (and flea) destruction has been developed—the flame thrower or fire-torch, hitherto used only in industry and in war. To date the most satisfactory type of

torch used has been one with a four-gallon tank connected with a burner coil by a flexible rubber hose. About one gallon of kerosene per hour is burned in continuous operation and the flame is said to have a temperature of 2 000°F. The torch can be used on wood, bamboo or cane surfaces without setting fire to them. It has so far been employed satisfactorily for burning off vegetation from ditch banks, killing rats and fleas in burrows, burning abandoned rat nests with their possibly infected fleas in mud walls, stone fences, adobe walls and other shelters, killing fleas within infected houses, killing rats, fleas, spiders, bed bugs, ticks, cockroaches, lice and other vermin in cracks and crevices of walls and floors in routine sanitation work in dwellings, restaurants, warehouses and other premises, killing rats in sewers, and igniting brush fences (a favorite rat harbor), garbage and rubbish piles. It is believed that the fire-torch can be effectively used in combatting any disease whose transmitting agent is an insect (flea, bed bug, tick, louse) which passes part of its life cycle in cracks and crevices in the walls and floors of human habitations or in the nests and burrows of its animal host. Among such insect-borne diseases are typhus fever, Chagas disease (American trypanosomiasis) and relapsing fever, as well as bubonic plague.

AMOEBIASIS

OSBURN (H. S.) Amoebiasis on the Witwatersrand.—*South African Med Jl* 1941 Nov 8 Vol 15 No 21 pp 431-433

No account has so far appeared on parasitic infections among the general population of the Witwatersrand, nor indeed have any extensive protozoological surveys been made in South Africa.

With the idea of finding out whether abdominal disturbances could be attributed to protozoal infections, the author made routine stool examinations during a period of four months on 63 patients complaining of abdominal pain, discomfort or diarrhoea. Three were natives, the remainder Europeans. In five patients *E. histolytica* cysts were found, but in only one, a European female with active dysentery, were trophozoites present. Of three European cyst-carriers, one only had symptoms attributable to this infection and was considered to be suffering from amoebic ulceration of the caecum.

Philip Manson Bahr

BLANCO (Carlos M.) Algo sobre la protozoarisis en nuestro medio [Protozoal Infections in Vera Cruz].—*Rev Med Veracruzana* 1941 Nov 1 Vol 21 No 11 pp 3539-3544

The number of persons examined by the author was too small for his findings to have general application. Of 200 who had been given anthelmintic purgatives, 110 (55 per cent) showed protozoa in the stools: *vis E. histolytica* 6, *E. coli* 10, *E. nana* 11, *Giardia intestinalis* 33, *Trichomonas* 43, *Chilomastix* 56.

H. H. S.

CHANG (S. L.) & FAIR (Gordon M.) Viability and Destruction of the Cysts of *Entamoeba histolytica*.—*Jl Amer Water Works Assoc* 1941 Oct Vol 33 No 10 pp 1705-1715. With 6 figs.

The authors have tested the influence on survival time of cysts of *Entamoeba histolytica* in water of the addition of chlorine at different

[May 1942]

temperatures and pH. In addition the effect of increase of concentration of the cysts in the suspension was tested. The procedure was to obtain cysts from culture media, wash them and suspend them in water and then expose them to the chlorine. After exposure the cysts were washed and introduced into an excystation medium to test their viability. In plain water the survival time appears to be unaffected by the quality of the water. It is affected, however, by the temperature. Thus at freezing point there is a survival of 90 days. This is reduced to 30, 10 and 3 days at temperatures of 50, 63 and 86°F respectively. The concentration of gaseous chlorine needed to destroy the cysts lies well within the range of practicable superchlorination if the period of contact can be extended to 30 minutes. A rise in temperature of 20°F reduced the required chlorine concentration by half while it was reduced by 23 per cent if the contact time was doubled. If however the density of the cysts is doubled a 25 per cent. increase of chlorine is required to destroy the cysts. A similar increased requirement is seen when the pH is increased from 7 to 9 while a 50 per cent decrease occurs when the pH is reduced from 7 to 6. In all cases the coliform organisms were destroyed before the cysts.

C. M. Wenyon
(Schäudinn) Observations on a Culture of *E. histolytica*—
Antonie van Leeuwenhoek J. Microbiol. & Serol. 1941 Vol. 7
No 1 pp 13-24 'Summary taken from *Biol. Abstr.* 1941
Dec Vol 15 No 10 pp 2295-2296 Signed J. C. Hoogenhede.]

Addition of insulin to the culture medium improved the growth of *E. histolytica*. The best culture medium was made as follows: Take 1 cc solidified Bacto-liver infusion agar with 2 cc serum-Ringer soln. on top with a Pasteur pipette deposit a 1-mm layer of the following suspension between solid and liquid phase—to 10 drops of m ulin (40 units cc) add 10 loopfuls of rice starch and 5 loopfuls of CaCO_3 . In this medium growth is luxuriant and amoebae are arranged in the form of nests, as if agglutinated and similar to their arrangement *in vivo*. They are very motile and many giant forms are present. Sheep erythrocytes are attracted and accumulate as a bouquet on the surface of the amoeba indicating polarization. Cysts also attract erythrocytes and they accumulate in a ring around the cyst but a little distance away (may be used as diagnostic criterion for cysts). Occasionally pseudopodia protrude from the amoeba rotate around their base, thus taking the shape of steel-scraps and then envelop the body and unite again with the base. Procyonin gives good vital staining.

KARUKARATNE (W. A. E.) The Pathology of Amoebic Hepatitis Including a Consideration of the Pathogenic Role of the *Entamoeba histolytica*—*J. Ceylon Branch Brit. Med. Assoc.* 1941 June, Vol. 38 No 2 pp 85-176 [Numerous refs.]

This contribution like its predecessors consists of an extensive detailed and, indeed, a learned exposition of hepatic amoebiasis, and as such will no doubt be regarded as a fund of information for future historians of this subject. If criticism may be permitted on such a thorough study then it may be said that too much reverence has been paid to the written word of the past at a time when the exact rôle

of *Entamoeba histolytica* was neither so well known nor appreciated as it is at the present day. The conflict between the past and the present is therefore apt to have a confusing effect upon definite conclusions. The importance attributed to alcohol as a predisposing factor in amoebic infection of the liver bears a distinct Victorian aroma as do also the quotations from the Barrack Room Ballads upon this subject.

The statement (p. 143) that the liver complication of bacillary dysentery is in the nature of multiple small abscesses whilst the common complication of amoebic dysentery is a large solitary abscess is certainly not in accordance with modern knowledge.

The conclusions from the evidence brought forward may be stated as follows —

The high mortality in Europeans in the first year of residence in the tropics is probably due to a want of adaptation to new environment rather than to lack of immunity owing to absence of previous infection. It is therefore necessary to assume the existence of various grades of susceptibility in the individual or else to postulate varying degrees of virulence of the parasite in order to explain the varied manifestations of amoebic infection and its equally fortuitous response to treatment and the disappearance of symptoms in the absence of such treatment.

Other points noted are the rare occurrence of abscess of the liver in spite of the alleged frequency of parasites in this organ, the greater susceptibility of the European immigrant and the marked resistance [?] shown by women and children to this complication—all of which emphasize the extraordinary relationship which exists between parasite and host. There are doubtless other factors of which we are at present unaware which may influence the aetiology of amoebic infection for instance that of the frequent concomitant bacterial infection both in intestine and liver.

There is yet much to be learned regarding the pathogenic potentialities of *Entamoeba histolytica* as well as the important and fundamental question as to the factors which make the amoeba produce disease in man.

P M B

DE PAULA (Homero Vianna) & FROTA (Paulo). Aspectos cirurgicos das protozooses. [Surgical Aspects of Protozoal Infections.]—*Brasil Medico* 1941 July 19 Vol. 55 No 29 pp 493-507. With 1 fig [31 refs.] English summary.

This is an interesting and comprehensive article dealing with the subject under the following heads: (1) The surgical complications of amoebiasis notably occlusion and subocclusion, tumours of the colon occurring in amoebiasis, acute amoebic appendicitis, a peritoneal syndrome due sometimes to actual perforation but sometimes in the absence of any such lesion, hepatic abscess, pleurisy and empyema from abscess of liver. (2) Protozoal infection simulating disease of a surgical nature such as symptoms indicative of acute, subacute or chronic appendicitis, dyspeptic symptoms and duodenitis simulating peptic ulcer, a pseudo-cholelithiasis due to *Giardia* and an analogous pseudo-nephrolithiasis. (3) Protozoal infection complicating diseases requiring surgical measures, such as appendicitis in a patient with amoebiasis or cancer of the bowel, salpingitis and a number of other conditions. Illustrative cases are recorded of most of the conditions referred to. The authors sound a note of warning that abdominal

[May 1942]

operations in patients with latent amoebiasis are commonly followed by a renewal of amoebic activity or of the symptoms due to them and it is advisable therefore that patients suffering from amoebiasis who have to undergo operation should, if there is time and operation not urgent be treated first for the protozoal infection if there is urgency then the treatment might be taken up at the same time

H H S

Pruijs (W M.) Over het leverabsces in de tropen. [Liver Abscess in the Tropics.]—*Geneesk Tijdschr v Nederl Indië* 1941 Sept 9 Vol 81 No 38 pp. 1894-1908 With 4 figs on 1 plate Also in *South African Med J* 1941 Nov 8 Vol. 15 No 21 pp. 427-431

Although emetine injections have done much to bring about disappearance of liver abscess the condition still requires diagnosis and treatment. The author has—out of a total of 2475 operations—dealt surgically with 22 cases in 9 years. He is not prepared to subscribe to the opinion that the excessive use of alcohol and opium smoking are factors of much importance in the development of liver abscess. The following points are set out as of diagnostic importance (1) A negative history of dysentery is of little significance (2) Jaundice is more likely to be diagnostic of carcinoma, syphilis or gallstones than of liver abscess (3) A soft enlarged painful liver with rounded edge is found in all cases of liver abscess Friction on auscultation, synchronous with respiration may be observed and sometimes shoulder pain (4) A blood examination may show leucocytosis with slight left shift and moderate toxic granulation Sedimentation rate is markedly increased (50-140) (5) X-ray examination is very valuable and should show a cupola-like displacement of the right or left half of the diaphragm (6) Amoebic cysts may be found in the faeces, but a negative result may also be obtained (7) Slight elevation of temperature is the rule and there is some increase of the pulse rate Treatment consists in (1) aspiration of pus (2) injection of emetine into abscess cavity and then subcutaneously (3) surgical operation. In cases of doubt an exploratory laparotomy is recommended.

H F Harej

SANDES (John D.) Amoebic Liver Abscess in Northern Ireland.—*Brit. Med J* 1942 Feb 7 pp 184-185 With 2 figs.

A case of hepatic abscess presenting two or three anomalous features. The patient was a soldier who had been in Cairo for one month and at Menia Matruh for eight months five years before coming under the author's observation. He stated that he had never suffered from dysentery but it must be remembered that in the first place, there may be lesions of quite an extensive character without any subjective symptoms, and, in the second, patients often forget a previous attack of dysentery if it was not severe and may have had what they considered at the time as just a go of diarrhoea and have forgotten it. Another unusual feature was absence of pain or tenderness on the right side and of shoulder pain but definite tenderness in the left lumbar region posteriorly, although the abscess was in the right lobe of the liver. The fact that no amoebae were found on examination of the liver pus removed is not an uncommon experience. H H S

LEE (Raymond S H) Amoebic Granuloma simulating Epithelioma of the Anus — *Caduceus* 1941 Aug Vol 20 No 3 pp 176-177

DONALD and BROWN [*Proc Staff Meeting Mayo Clinic* 1940 Vol 15 No 21] have drawn attention to this complication which if not immediately recognized may lead to unnecessary surgical intervention

The subject of this report was, indeed wrongly diagnosed in the first instance and partially treated as epithelioma of the anus before the discovery of *E. histolytica* cysts.

The patient a Chinese woman of 41 gave a two months history of anal swelling mistaken for piles. Intense pain had been experienced and there was loss of weight. A perianal ulcerated mass with everted edges was present. This extended into the anal canal and was accompanied by enlarged and hard inguinal lymphatic glands. The patient was also suffering from diabetes. A transverse colostomy was performed after which examination of faeces revealed cysts of *E. histolytica*. With emetine injections 1 gr for 12 treatments and quinoxyl enemata the granuloma and attendant swellings of inguinal glands entirely disappeared.

The colostomy being closed uneventful recovery took place.

P M B

DAYALU (T H) & JAYARAM (S S) Entero-Vioform in Amoebiasis — *Med Bull Bombay* 1941 Oct 18 Vol 9 No 20 pp 613-616

It is claimed that the treatment of amoebiasis has been largely solved by the introduction of Entero-vioform and the authors go so far as to claim that this disease in Bangalore if uncomplicated can always be cured by the judicious use of this drug with the aid of adjuvants as occasion demands

As is well appreciated, amoebiasis is protean in its manifestations. It is claimed here that cases range from those with symptoms suggesting slight vitamin B₁ deficiency to those with hepatitis and conditions resembling abdominal tuberculosis. It is not an infrequent cause of secondary anaemia. The patients in this series (nine in number) were treated as in patients and exhibited typical blood and mucus in the stools with amoebae pus and red cells. There were no failures though a few required a second course. Entero-vioform is especially indicated in children who are liable to the toxic effects of emetine. No toxic effects were noted except gastric irritation. For an adult the dose is four pills daily for the first five days thereafter the number is reduced. [The tablets presumably contained 0.25 gm of the drug each though this is not stated.] Tenesmus and griping are relieved almost instantaneously by a retention enema of two pills in one ounce of water. In all acute cases the amoebae disappear from the stools in seven days. Blood and mucus cease in 2-3 and diarrhoea in 4-5 days. A table is given setting out details in nine cases. It is to be noted that no less than six also received adjuvant treatment of emetine injections. [The dullness of statistics is enlivened by such phrases as plethoric lady and child turned a new leaf. The impression is gained that this is an example of entirely uncritical work and there appears to have been no attempt at a follow up.]

P M B

LIE (Shao-kwang) CHANG (Yao-teh) & CH'UAN (Ts'e-kwang)
Yatanine, an Antiamoebic Drug. A Preliminary Report.—*Chinese*
Med J 1941 Sept Vol 60 No 3 pp 229-231

Yatanine or K u-shen-tru has been used empirically for dysentery for centuries. It is derived from the seed of *Brucea* sp and seems to be the same as K'o-sam [see this *Bulletin* 1937 Vol 34 p 955]. The kernels contain essential oil fat phytosterol sugar glucosides saponin, tannins and alkaloids. Yatanine is the name given to the alkaloid for extraction of which the following procedure is adopted —

Extraction — The extraction of alkaloid was proceeded with according to S K Liu's method. The treated powder finely acid, was digested under reflux condensation with 80% ethyl alcohol. Digestion was discontinued as soon as the alcohol started to boil. The alcoholic extract was concentrated to form a syrupy mass, and then was slightly acidified with hydrochloric acid. This was warmed to 70°C. The insoluble fats oils phytosterols and other impurities were filtered off. The filtrate was further dried to form a semi-solid mass again finely alkylized and finally digested with ether until the ether just boiled. Through successive digestion and purification with ether the white base Yatanine was obtained.

Whereas the whole seeds cause gastric irritation with nausea and vomiting and the essential oil is a powerful irritant causing itching swelling inflammation and even vesication, which might persist for a week defatted kernels had none of these effects. Adults suffering from amoebic dysentery were given 1-2 gm of dried defatted kernels in tabloid form or 30-60 kernels on the first night and on the two following days 0.4-0.8 gm (or 10-20 dried kernels) thrice daily after meals. On the fourth day half this was given daily for a fortnight. Tenesmus was relieved and the number of stools reduced by the second day, thenceforward improvement was steady. Entamoeba disappeared within a week in some this result was obtained when yatanen carbamone and emetine had failed.

Yatanine immobilized infusoria rapidly, and in a dilution of 1 in 10,000 killed them in a short time. [The author does not mention the dose of the alkaloid itself alone nor does he mention having tried it in human cases of amoebiasis.]

H H S

RUSSELL (William C) LAYTON (Walter B) FRICK (W D) & CUTTING (Windsor C) General Actions, Toxicity and Clinical Effects in Amoebiasis of Kosam, an Oriental Amoebicide.—*Amer J Trop Med* 1941 Nov Vol 21 No 6 pp 731-738

Kosam, an old oriental remedy for diarrhoeal conditions is the seed of *Brucea javanica*. The claims of benefit in the treatment of amoebic dysentery [see this *Bulletin* 1937 Vol 34 p 955] needed confirmation or refutation and the authors undertook an investigation to determine this. Their study comprised three parts —

1. Comparison between it and nearly a score of other drugs (including emetine hydrochloride viroform carbamone, yatanen, members of the sulphonamide group and others) on cultures of *E. histolytica* *in vitro*. The results compared favourably with several others but Kosam was no better than some of the rest.
2. Tolerance and toxicity in mice rats, guinea-pigs, dogs and cats. The drug caused gastric irritation as it does in man but without indications of systemic poisoning. Nausea and vomiting were common.

3 Clinical trials in seven human subjects with amoebiasis. In five the nausea was troublesome two remained positive three others relapsed after temporary improvement and benefit. The doses given should have been adequate 100 seeds in two days or 200 in six days in another 240 in twelve days.

Briefly the good reports of its use could not be confirmed by the authors

H H S

BACILLARY DYSENTERY

WILSON (W James) & BLAIR (E M McV) A Tellurite-Iron-Rosolic Acid Medium Selective for *B. dysenteriae* (Flexner) — *Brit Med J* 1941 Oct 11 pp 501-503 [Summary appears also in *Bulletin of Hygiene*]

The observation that the addition of tellurite to MacConkey's medium inhibited most coli-aerogenes strains without fully inhibiting strains of Flexner's bacillus was followed by the discovery that the further addition of appropriate amounts of iron citrate or iron alum converts the tellurite to a form which permits the rich growth of *Bact. flexneri* and yet inhibits *Bact. coli* to a very large extent. The purpose of the rosolic acid is to inhibit *Strep. faecalis* and also to act as an indicator. The recommended medium is prepared as follows.

To 100 cc. of melted nutrient agar cooled to 60°C. in a flask are added 0.5 cc. of 1 per cent. rosolic acid dissolved in absolute alcohol, 1 cc. of a 4 per cent. watery solution of iron alum and finally 3 cc. of a lactose-tellurite solution. The latter solution is made by boiling 20 grammes of lactose in 100 cc. of distilled water cooling the solution and then dissolving in it 0.2 gramme of potassium tellurite. It is necessary to dissolve the tellurite in the cold otherwise reduction occurs. This lactose-tellurite solution keeps for weeks the tellurite being an effective preservative against bacteria, but not against moulds. Growth of the latter can be prevented by the addition of 3 per cent. of ether and keeping the bottle tightly stoppered.

Plates are poured and allowed to set with the lids removed. A large loop of a thick faecal suspension is spread on the medium and allowed to dry. In 18 hours the pink colonies of Flexner's bacillus are readily distinguished from any yellow colonies of resistant *Bact. coli* and can be confirmed by slide-agglutination and confirmatory tests. On this medium the growth of typhoid paratyphoid bacilli, Sonne's bacillus, the cholera vibrio and all of twenty species of *Salmonella* food poisoning organisms is completely suppressed.

J C Cruickshank

LANCET 1942 Jan 3 pp 20-21 — Treatment of Bacillary Dysentery with Sulphaguanidine.

It is welcome to read a report to the War Office upon the use of sulphaguanidine in the treatment of bacillary dysentery in the Middle East by N H FAIRLEY and J S K BOYD. So far the drug had been reserved for severe and persistent chronic cases, and the restriction has often led to delay in commencing treatment. Out of some 371 cases 135 were due to Shiga infection. This preliminary report deals mainly with these.

The effects are increased feeling of well-being, within 24-48 hours of administration rapid relief of abdominal pain and tenesmus with decrease of abdominal symptoms—together with a fall in temperature and pulse-rate. A remarkable reduction in the number of stools takes place and as a rule, within 5-6 days, the bowels act once or twice daily. At the same time there is rapid disappearance of blood from the faeces though mucus takes much longer to disappear.

The earlier the treatment with sulphaguanidine the less extensive is the damage to the colon and the more rapid convalescence and recovery. The most dramatic cures were naturally in acute cases treated within 24-36 hours from the onset. Of 12 cases in which treatment was not commenced till a late date (21st day and over) three were listed as possible failures. They were all chronic cases of bacillary dysentery and it is probable that full courses of treatment in the first instance would have produced cure.

There were five fatal cases in which sulphaguanidine treatment was attempted but they were apparently very severely ill or moribund before treatment was commenced and information is lacking regarding the total quantity of the drug administered. There were other complications, such as cerebral thrombosis, bilateral hydronephrosis and lobar pneumonia. Although no analysis of cases other than of Shiga infection is given, cases of dysentery due to Flexner, Shmitz and Sonne infections treated with sulphaguanidine have been restored to health and rapid healing of the colon observed by sigmoidoscopy. The action of sulphaguanidine is either bacteriostatic or bactericidal leading to cessation of damage and decrease in toxin production. It appears to exert no effect on dysentery exotoxin already absorbed, but in Shiga dysentery this can be neutralized by intravenous injection of Shiga antitoxin. Therefore sulphaguanidine and antidysenteric serum are mutually complementary and therefore in fulminating Shiga dysentery both are indicated.

Toxic manifestations were mild—mainly headache associated with malaise and occasional transient erythematous or papular eruption. No cases of haematuria were recorded, and toxic nephrosis (toxic nephritis) which may complicate bacillary dysentery has no relation to the administration of the drug. P. M. B.

(In a recent Army Medical Directorate Bulletin the following doses of sulphaguanidine are given—

In the acute cases the average dose was 20 gm. per diem, with an aggregate of some 135 gm. for each case. For mild acute cases of Shiga infection the recommended dose for adults is 20 gm. each day for the first two days and 10 gm. each day for the next three days.

In individuals who are not ill, but from whom true dysentery bacilli can be recovered the doses suggested are 18 gm. in the first 24 hours, administered in 6 gm. doses three times a day after meals, subsequently 3 gm. three times a day for five days.—Ed.]

EDWARDS (Lydia B.) Sulf. guanidine in the Treatment of Bacillary Dysentery.—*Southern Med J* 194 Jan. Vol. 35 No 1 pp 48-53 With 1 fig & 1 chart.

This paper consists for the main part of a résumé of the literature of sulphaguanidine which has been adequately reviewed in this *Bulletin*. An attempt has been made to estimate the concentration of sulphaguanidine in the stools of patients receiving this drug, and to contrast the

results with those already obtained with sulphaguanidine. These investigations were conducted in infants in whom it was impossible to avoid contamination of the stool with urine so that a certain degree of error was bound to creep in.

The preliminary results suggest that in large oral doses sulphathiazole may be present in fairly high concentration in the stools though usually below saturation. The lowest values were usually observed in normal, not in diarrhoeal stools. In comparing these two drugs it is interesting to note that in 33 children taking sulphaguanidine no definite toxic reactions occurred whereas in 281 children receiving sulphathiazole up to June 1941 approximately 9 per cent developed toxic symptoms.

In the discussion on this paper G. M. LYONS confirmed his views on sulphaguanidine in the treatment of severe or moderately severe forms of acute bacillary dysentery. In association with L. C. HALL he was now able to present a study in which alternate patients were treated with sulphaguanidine the others being observed as controls. The Flexner (Hiss Y) type was the organism most commonly encountered. Failures were encountered in those who presented other significant clinical features such as pyogenic infection, a history of diarrhoea for more than a week before chemotherapy or alternatively a diarrhoeal disease of a serious nature within 4-6 weeks before sulphaguanidine treatment.

This report also confirms the almost complete absence of any significant evidence of toxicity, the ease and simplicity with which the drug could be administered and the early disappearance of nausea, vomiting and malaise. A further study of nearly 300 patients was undertaken to test the practicability of this drug in the out patient department of a baby clinic in general practice and in the homes of private and clinic patients. Eight of patients so treated died, only one of whom received more than four doses of sulphaguanidine. One patient who had received what was considered to be adequate dosage led of some unspecified diarrhoeal disease. One third were hospitalized but it was found that the effectiveness of this drug made possible a very marked reduction in the number of patients admitted to hospital. In the hospital group most had the severe form of the disease. 51 had pasty stools and became afebrile in three days or less in four days, 7 in five days and one each in six and nine days respectively. In all 259 patients (excluding the neonatal group) were treated with sulphaguanidine. Of these 195 passed normal pasty stools and were afebrile in three days or less, 21 in four days, 17 in five days and 1 each in six and nine days respectively. Such results were unobtainable by previous methods of treatment.

This experience in the dosage recommended by MARSHALL showed that when so employed sulphaguanidine is safe in dispensary and out patient practice for bloody flux and is a much safer drug than sulphathiazole. Relapses occurred almost exclusively in those receiving inadequate dosage. On the basis of this experience it is recommended that sulphaguanidine should be given as early after onset as possible every 4 hours for 3 days then every 8 hours for 2 days more.

R. E. CHING who admitted that his experience with sulphaguanidine was limited, was satisfied with sulphathiazole (in 23 cases) given in 3-4 gm. doses initially followed by 1 gm. four hourly. The blood levels varied from a trace to 8.5 mgm per cent. [See also this Bulletin 1941 Vol. 38 pp 596-600]

SUAREZ (RAMON M.) & MORALES (Federico Hernandez) The Treatment of Bacillary Dysentery Preliminary Report on the Use of Sulfaguanidine.—*Bol. Asoc. Med. de Puerto Rico* 1941 Sept. Vol. 33. No. 8 pp. 347-353.

In a study of a series of 30 cases of bacillary dysentery the authors were in the main able to confirm previous knowledge upon the action of this drug. All but one were acute cases. Sulphaguanidine was used in 17 whilst 13 served as controls receiving symptomatic treatment only consisting of starvation diet and adequate fluid intake. The main infecting organism was Flexner's bacillus—the Newcastle bacillus was present in 5 and Sonne's bacillus in 1.

Seven were children below 1 year of age seven from 1 to 7 sixteen from 23 onwards. No deaths occurred in the sulphaguanidine series, nor in the controls. Out of the 13 treated symptomatically 3 recovered as rapidly as those on chemotherapeutic treatment but the remaining 10 went through the familiar prolonged clinical course. There were 3 relapses as compared with 1 only in the sulphaguanidine series. The reappearance of Flexner bacilli in the stools of a few cases may be due to relapses or even fresh infection.

The initial dose of sulphaguanidine was 0.1 gm. per kgm. of body weight and 0.05 gm. every four hours until the number of stools was reduced to four in twenty-four hours then 0.1 gm. per kgm. every 8 hours for at least three days.

The total dosage was often very large—much more so than in any other communication hitherto reported. For instance one adult male (33) received 164 gm. in eleven days. There were no toxic manifestations except a mild skin rash.

In one instance sulphaguanidine (total 24 gm.) did not appear so effective. This patient had severe ulcerative colitis so extensive as to necessitate colectomy but he also had concomitant malaria (*P. falciparum*) and Flexner bacilli had on occasions been isolated from the stools. It is concluded that sulphaguanidine shortens considerably the clinical course of acute bacillary dysentery acts better when given early in the disease but may exert a favourable influence even when administered on the 10th or even 15th day of illness.

P. M. B.

CORVAX (Warren C.) Studies on the Chronic Toxicity of Sulfaguanidine (Sulfanilylguanidine).—*Bull. Johns Hopkins Hosp.* 1941 July Vol. 69. No. 1 pp. 38-52.

The preparation, chemical and physical properties of sulphaguanidine have already been adequately described. On the basis of experiments on mice, rats and dogs, it has been concluded that, when given by the mouth, it is probably less toxic than sulphapyridine and sulphathiazole. This compound is conjugated in the mouse, rabbit and man, but not in the dog—the toxic effects in rabbits were due to deposition of acetylsulphaguanidine in the collecting tubules and pelvis of the kidneys. At the meeting of the Southern Surgical Association (Dec. 1940 unpublished) it was stated that the reduction of the number of bacteria in the alimentary canal produced by sulphaguanidine, though not always striking, was always sufficient to permit operation without the usual risk of infection.

Since in previous studies sulphaguanidine has not been employed in dogs for more than one week and since monkeys had not been used the present study was undertaken to determine the pharmacological effects and pathological changes resulting from administration of the drug to dogs and monkeys (*Macaca mulatta*) for a period of one month. The drug was also administered to rabbits.

The effect of sulphaguanidine on stool cultures from dogs and monkeys does not in these animals result in a decrease in the number of bacteria. An interesting finding has been the reversal of the differential count in all instances. The Gram positive organisms, especially cocci increase at the expense of Gram negative bacilli. In some cases the latter completely disappeared. It is evident that reversal of the differential count begins almost immediately.

Observations on blood concentration time curves bear out the claims already made for sulphaguanidine.

In agreement with the findings of MARSHALL and his colleagues sulphaguanidine was found extremely toxic for rabbits, owing apparently to the fact that rather large amounts of the drug are absorbed and a very high percentage converted into the acetylated form. In consequence the collecting kidney tubules are obstructed by sulphaguanidine. Subsequently there occurs a further rise of the level of the drug in the blood particularly of the acetylated form with consequent retention of nitrogenous waste products.

The urine obtained either by catheterization on the fifth day or taken directly from the bladder after death, revealed a great amount of sediment mainly composed of very characteristic crystals 5-30 μ in breadth and 15-30 μ in length. On analysis these were found to be composed of 74.1 per cent acetyl sulphaguanidine and 6.4 per cent free sulphaguanidine. No significant changes were noted in the haemoglobin values or red and white blood cell counts.

Necropsy findings in rabbits showed identical pathological changes in the kidneys and spleen. Grossly the kidneys were large soft boggy and pale. On the cut surface the collecting tubules stood out as yellowish glistening streaks radiating fanwise from the central medullary papilla. This delineation was found to be due to the packing of crystals.

Microscopically the tubules and glomerular spaces were dilated and contained albuminous fluid casts and debris.

The spleen was much reduced in size microscopically these changes lay in atrophy of the Malpighian corpuscles and splenic pulp.

All dogs remained well during the 28 day period of administration of the drug. There were no constant urinary findings except that on two occasions the sediment obtained by centrifugation of the urine contained large numbers of leucocytes and needle-like crystals.

In view of the large dosage employed the blood levels of sulphaguanidine remained remarkably low throughout the experimental period. This was to be expected as dogs do not conjugate sulphaguanidine as in the cases of other sulphonamide compounds.

All six monkeys remained well. Only one failed to show at one time or another crystals (presumably sulphaguanidine) on microscopic examination of centrifuged urine.

The blood levels of sulphaguanidine remained low throughout the experiment. The percentage of acetylation averaged 40 per cent.

was 24 oz. maize meal and 8 oz. beans daily 8 oz. groundnuts and 8 oz. fish or meat weekly but there are signs that improvement is imminent. Sickness and apathy are common. Since the employers value efficiency it should not be difficult to get them to provide better diets. The author urges nutritional surveys, assays of local food, an agricultural policy designed to remedy dietary deficiencies, and dietetic education of the African and his employer and scientific soil development

H A Green

TANGANYIKA TERRITORY MEDICAL DEPARTMENT Medical Pamphlet No 29 (2nd Edition) *Suggestions for Improving the Feeding of Labourers in Tanganyika* [McKENNIE & PLATTS (S. A.)] 10 pp. 1941 Dar es Salaam Govt Printer

A useful pamphlet intended especially for employers of labour and written in non-technical language

C IV

SQUIRES (Bernard T) *Early Signs of Deficiency Disease in South African Natives.*—*South African Med J* 1941 Nov 22 Vol 15 No. 22 pp. 449-450 With 2 figs

The author commences his article with the statement —"Although the literature upon various aspects of deficiency disease has now reached enormous proportions, only a small part deals with those complaints from the clinical standpoint and a still smaller part with the early signs." This hardly seems fair to this *Bulletin* which for a number of years has drawn attention to these conditions. It is noted that no references are given to the *Bulletin* and none to the many papers reviewed therein.

The author gives some notes of conditions met with among 2,000 South African natives treated in South African native reserves and in Bechuanaland. He comes to the same conclusion reached by many others, that single deficiency states are rarely met with. His opinions on the question of deficiency are presumably based entirely on the dietetic history. He says the eye and its appendages are involved early in simultaneous vitamin A and B₁ deficiency and then describes the well-known conditions commonly written down as due to A avitaminosis. No mention is made of those other conditions now considered to be due to riboflavin deficiency. There is no mention either of the amblyopia (retrobulbar neuritis) found by Fitzgerald Moore in West Africa.

Changes in the skin met with by the author include angular stomatitis, eczematous conditions of the ano-genital region and phrynoderma, also glazing and hyperpigmentation of the skin of the shins. Attention is also called to a patchy depigmented condition of the skin of covered parts of the body and limbs, which since improvement occurs when cod liver oil and yeast are given the author believes is an early sign of deficiency disease. It would be interesting to hear more about this condition, which as far as can be judged from the photographs, has not before been described. Some other well-recognized, changes in the mouth are also noted. Of vitamin C deficiency it is stated that Painful induration with swelling of the calf muscles is a common sign of early scurvy and often appears before any oral manifestations. No mention is made of the typical skin changes in scurvy and it should be recognized that the affection of the gums is no good criterion of lack of ascorbic acid.

Lastly is included a syndrome consisting of a fluttering apex beat associated with attacks of recurrent oedema of the lower limbs without albuminuria. Nothing is said as to the possible underlying cause but possibly it might be akin to so-called cardiac beriberi.

H S Stannus

EARLE (K Vigors) *Avitaminosis in Apparently Healthy Trinidadians* — *Brit Med J* 1942. Feb 21 pp 255-257 [10 refs]

FASAL (Paul) *A Nutritional Survey of the Federated Malay States. III. Supplementary Food on Estates.*—*Bull Inst Med Res Federated Malay States* 1941 No 1 16 pp

Subnutrition is common among Tamil and Malay children and fairly common among adults particularly women. The chief deficiencies are of protein fat vitamin A calcium and iron. Suggestions for improving the diet of the whole estate population e.g. communal feeding propaganda vegetable allotments and the provision of skilled gardeners are made and immediate help for the children advocated. Many estates already provide children with supplementary meals e.g. Reed's pudding and Millard's mixture. Both of these counteract the vitamin deficiencies the former also improves growth. New more palatable supplements cheaper and more nutritious which will appeal to adults as well as children are discussed. Soya bean forms an ideal basis. Its composition is compared with that of other food stuffs. A cake of soya bean skim milk powder yellow dhal, rice flour and red palm oil is described which fulfils all the requirements and is equally acceptable to Tamils Malays and Chinese. Soya bean and skim milk are imported so indigenous substitutes were considered. Coconut or groundnut cake could partially replace soya bean but additional ghee dhal and rice flour are recommended. Skim milk could be replaced by fish meal and possibly by bone meal. Recipes and the nutritional composition and costs of all the supplements mentioned, are given. The distribution of supplements at infant welfare centres schools etc is urged.

H N Green

RAYMOND (L D) *Red Palm Oil*. [Correspondence.]—*Trans Roy Soc Trop Med & Hyg* 1941 Nov 29 Vol. 35 No 3 pp 199-200 [Summary appears also in *Bulletin of Hygiene*]

The process described results in the production of a cheap and palatable source of vitamin A for use in tropical countries. Nyctalopia was formerly fairly common among prisoners in Tanganyika, whereas since the issue of $\frac{1}{4}$ oz. of palm oil daily this condition has become a rarity. Liking for crude palm oil seems however to be an acquired taste and the flavour especially if the oil is highly acid is obnoxious. Nevertheless especially at the present time troops require a good and sure supply of vitamin A. The author of this note finds that treatment by steam *in vacuo* for 2-3 hours at 150 C results in deodorization of the oil. Very little carotene is oxidized during the process. The oil thus treated is mixed with 5 volumes of good quality crude groundnut oil or sesame oil, or deodorized coconut oil. The mixture is acceptable to African troops it contains a minimum of 2 000 microgrammes of carotene per ounce and may contain double that amount.

H H S

harvest in November and December stocks of rice may be low and the new crop required for use immediately by the poorer villagers. Accordingly they use parboiled rice for a month or so. When the paddy has matured they return to raw rice which they prefer."

In the Godavari Delta machine-milled grain is consumed mostly whether it is parboiled or raw. COWGILL in 1934 and WILLIAMS and SPIES in 1938 showed that when the vitamin B_1 /calorie ratio falls below 0.25 the risk of beriberi is great. If this be estimated on the findings of the present study the first survey gives 0.28, the second 0.20 in other words the latter is below the "danger point."

H H S

MEYERS (F M) Possible Adaptation to a Low Vitamin B_1 Intake.—*Amer J. Med. Sci.* 1941 June Vol 201 No. 6 pp. 785-789 [15 refs.] [Summary appears also in *Bulletin of Hygiene*]

Although beriberi is common in some parts of the Netherlands East Indies sub-clinical vitamin B_1 deficiency is not. A standard diet containing 1.5 to 2 mgm of thiamin was given to 16 healthy Javanese men and the daily urinary output estimated for one to three days. They were then given subcutaneous doses of 2 to 4 mgm of thiamin daily for two or three days. As controls three Chinese with mild beriberi, and three healthy Javanese who were given a diet rich in vitamin B_1 for a preparatory period of 5 to 17 days were tested similarly. In the healthy persons the thiamin output varied from 0.63 µgm daily. The percentages of the test doses excreted ranged from 10 to 50 but chiefly from 10 to 30 and there was no significant difference between the healthy control and test groups. Although the normal thiamin excretion was much lower in all persons than that found in temperate regions, the proportion of the test doses excreted was similar to that found in Europe and the U.S.A. The author has found that in sub-clinical vitamin B_1 deficiency adrenalin produces a greater rise in blood pressure after a patient has been treated with thiamin. The test was positive in the three beriberi cases and in three of the experimental group, but in none of the three prepared control persons. No correlation was found between the thiamin output and the results of the test and it is concluded that a low thiamin output, though indicating a low vitamin B_1 level in the body does not necessarily indicate that a deficiency state exists. In spite of the fact that the diet of this population is probably very low in vitamin B_1 consisting of a large proportion of unpolished rice only a small proportion develop clinical symptoms of vitamin B_1 deficiency. A long continued low vitamin B_1 intake probably results in an adaptation of the body.

H V Green.

ATKROYD (W R) & KRISHNAN (B G) Infantile Mortality in the Beriberi Area of the Madras Presidency.—*Indian J. Med. Res.* 1941 Oct Vol 29 No 4 pp 703-708 With 1 chart.

Infant beriberi has not been reported in India but judging by analogy of Japan where in 1928-32 one-third of those dying from beriberi were infants under one year and of Manila where they constituted practically one-half it is probable that the disease is common in infants in beriberi areas.

The authors have studied this question in the Northern Circars district of the Madras Presidency. The symptoms in the more acute forms of infant beriberi are thus described —

The infant is suddenly seized with what appear to be severe paroxysms of pain. During a paroxysm it may straighten out its body and become quite rigid. Between attacks the muscles feel abnormally soft and flabby. Vomiting is frequent. There is usually cyanosis and coldness of the extremities and difficulty in breathing is obvious. Right-sided dilatation of the heart is common and the pulse is weak and rapid. Excretion of urine is diminished. General oedema is rare but localized oedema may be observed. A husky or almost inaudible voice due to oedema of the larynx and not to paralysis of the vocal cords is very characteristic of infantile beriberi. The knee-jerks may be absent. Death often occurs within 24 hours unless the appropriate treatment is given.

Now at St Joseph's Hospital Guntur it had been noticed that breast fed infants presenting some such clinical picture and acutely ill could be relieved rapidly by injection of pure vitamin B₁ and examination of the mother would yield evidence of beriberi—numbness tingling slight paresis.

Again in beriberi areas infants at the age of 3-4 months are most commonly attacked and infant mortality is higher in the 1-6 month period than in the first four weeks of the 6-12 month period. The following table compares the rates in 17 towns in the beriberi area with an equal number outside that area and brings out this point.

Infantile mortality in 34 towns (1936-39)

	Reported average infant mortality rate	0-1 month. Percent. of total infant mortality	1-6 months. Percent. of total infant mortality	6-12 months Percent. of total infant mortality
17 towns in beriberi area	203	34.2	41.8	24.0
17 towns outside beriberi area.	164	52.7	28.9	20.4

In Burma the infant mortality in 1928 was 23.5 under one month, 58.0 in those from 1 to 6 months and 18.5 in the 6-12 month period but—and this is the important point—the peak was in the 1-2 month period and not at the 4th month and the high rate is ascribed to wrong feeding of infants giving them solid food after the first month. This and the evidence given above is held to suggest though of course it does not *prove* that beriberi is a cause and an important cause of infant mortality in the Northern Circars district of the Presidency.

H H S

EARLE (K Vigors) Notes on Infantile Beri-Beri in Nauru.—*Jl Trop Med & Hyg* 1941 Nov 1 Vol. 44 No 21 pp 142-144

The symptoms of infantile beriberi as seen in Nauru at the present day differ considerably from those recorded in BRAY's original description in 1928 [this *Bulletin* 1928 Vol. 25 p 869] this is probably ascribable to the changed diet and habits of the present-day Nauruans as compared with those of thirteen years ago. On clinical grounds the

author divides cases into acute chronic, diarrhoeic and insidious [which, of course, is not a classification]. He himself states that the acute may arise from the chronic the diarrhoeic form is an "acute" disease and may also intervene in the chronic, while the "insidious" comprises a mingling of symptoms due to other avitaminosis as well as B₁.

The chronic form should, states Dr Earle, be better named "pre-beriberi" as the fat and flabby and flatulent infant with enlarged liver and spathetic when examined may at any time become an acute case, with symptoms of gastro-enteritis (vomiting, colic, abdominal tenderness and slight rise of temperature) or respiratory affection of a capillary bronchitic type (dyspnoea cyanosis, dullness on percussion, râles and bronchial breathing) or meningismic with retraction of head, twitching rolling of eyes, dilated pupils, drowsiness to coma.

The diarrhoeic form rapidly brings the child to a state resembling marasmus, with sunken fontanelles widened features, rhagades and perhaps thrush.

Treatment is on the usual lines of administration of vitamins

Toddy which used to be a favourite remedy and most effectual in the fermented form is not allowed, by law to be made, and the unfermented contains no vitamins. The author observed good results to follow the use of a sulphonamide drug, but whether this does more than benefit secondary infection needs further study and comparison with control cases.

H H S

FAMILY (Lydia) Does Infantile Beriberi occur in Infants who have never been Breast-fed?—*Trans Roy Soc. Trop Med. & Hyg* 1941 Nov 29 Vol 35 No 3. pp 177-182. [16 refs.]

According to the author under the term "Infantile Beriberi" two distinct conditions have been (and are) included. One an intoxication occurring in breast fed infants, of which the symptoms are vomiting restlessness, abdominal pain, cyanosis, dyspnoea and running pulse the other a true avitaminosis with such symptoms as anorexia, retarded growth, loss of weight anaemia, inattention, oedema, aphonia, meteorism and constipation. The former usually appears in the first 100 days of life of the breast fed child, and only in the breast-fed, whereas the latter occurs in older children who have been "brought up by hand" or breast-fed, entirely or in part. The latter (avitaminosis) may exist without the former and the former without the latter or the former may pass, even suddenly into the latter.

More must be said about the intoxication form. In the milk of women (who may themselves be suffering from deficiency of vitamin B) is a substance, methyl glyoxal, an intermediate metabolic product of carbohydrates, which is toxic. When an infant ingests this it tries to get rid of this and other intermediate products, partly by excretion, partly by further oxidation of them by means of vitamin B as co-carboxylase. The infant's reserve of this is soon used up the toxic products accumulate and, especially the methyl glyoxal, cause the symptoms of "breast milk intoxication," as described above. Such children may make satisfactory progress until these toxic products occur in the milk, when transition to the avitaminotic state may rapidly take place. On the other hand, infants who have been fed artificially since birth are ill-nourished before manifestations of avitaminosis B declare themselves and the transition to a beriberic state is gradual and

insidious and they in many cases, succumb to intercurrent disease commonly bronchopneumonia before symptoms of the adult type of beriberi appear

[The abstractor of this article has tried to do justice to the author and to express a complicated problem in as simple a way as possible according to his conception of the author's thesis. The whole however is not easy to grasp and is somewhat complicated by the author's classification of several conditions under the term Infantile Beriberi. Initial I.B. which by the author's diagram may pass on to Subacute I.B. or to Acute or Chronic I.B. while either of the last two may be a sequela of the first. Having made the distinction between breast milk intoxication and B-avitaminosis and stressed it the author appears to throw over the whole position in her summary by calling both conditions Infantile Beriberi.] H H S

SUNDARARAJAN (A. R.) The Vitamin B₁ Content of Human Milk.—*Indian Jl Med Res* 1941 July Vol 29 No 3 pp 567-573 [13 refs]

The author has examined human milk of subjects without signs of beriberi for its content in vitamin B₁, flavin, calcium, ether extractive, lactose and protein and for vitamin B₁ and riboflavin in cases of maternal and infant beriberi. For details of analytical methods the original must be consulted. The author presents his findings in two tables and sums them up as follows—

1. The vitamin B₁ content of 44 samples of human milk has been determined by the thiochrome method. In this series neither mothers nor infants showed evidence of beriberi. The average vitamin B₁ content was 16.3 µg per 100 ml. when the infant was under 4 months and 19.5 µg when it was over this age.

2. In cases in which beriberi was present in the mother and in some instances in the child an average value of 16.0 µg per 100 ml. was observed. It is suggested that a toxic factor, the product of deranged carbohydrate metabolism resulting from vitamin B₁ deficiency in the mother, may be the precipitating cause of infantile beriberi.

This is of particular interest in connexion with the work by Dr FERILV (above) H H S

LAWS (Clarence L.) Sensitization to Thiamine Hydrochloride.—*Jl Amer Med Assoc* 1941 July 19 Vol 117 No 3 p 178

The patient was given thiamin hydrochloride subcutaneously at first each day but later at weekly intervals during several months. She then allowed 10 days to elapse and half an hour after receiving the next injection suffered from an attack of urticaria with oedema of the face which responded to adrenalin. Intradermal injection of thiamin proved this to be the sensitizing agent and it is noted that she was not sensitive at the beginning of the treatment. It is therefore suggested that intradermal tests should be made in patients who have previously received thiamin injections before commencing another course.

C II

MASON (Harold L.) & WILLIAMS (Ray D.) The Effect of Ingestion of Nicotinic Acid on the Determination of Thiamine in Urine by the Thiochrome Method.—*Jl Biol Chem* 1941 Aug Vol 140 No 2 pp 417-422.

ROBERTSON (R. Cecil) BARD (Solomon) & CHEN (John) The Post Mortem Appearances in Acute Cardiac Beri-Beri (Preliminary Communication).—*Caducus* 1941 Aug Vol. 20 No 3 pp 162-170 [21 refs.]

FAMILY (Lydia) Chinese Superstitions and Prejudices in Relation to Beriberi.—*Jl Philippine Med Assoc* 1941 Feb. Vol. 21 No. 2. pp 87-90

FAMILY (Lydia) The Prevention of Beri-Beri.—*Chinese Med Jl* 1941 July Vol 60 No 1 pp 53-65 [17 refs.]

PELLAGRA AND ALLIED CONDITIONS

BEAMS (Argyl J) FREE (Alfred H) & GLENN (Paul M.) The Absorption of Galactose from the Gastro-Intestinal Tract in Deficiency Diseases.—*Amer Jl Digestive Diseases* 1941 Nov Vol 8 No 11 pp 415-421 With 2 figs. [17 refs.]

Absorption from the intestinal tract may be impaired because of anatomical, chemical or physiological changes which may be responsible for a deficiency state—or again defective absorption may be produced by this same state. At present most of this evidence is indirectly derived from clinical observations. Thus, for example carcinoma, intestinal anastomoses, partial stenosis and ulcerative colitis have been found to evoke the pellagra syndrome. moreover pernicious anaemia may develop under similar circumstances. Those instances of this latter disease which respond solely to parenteral liver administration may possibly come under the same category.

Some simple clinical test for detecting such faulty absorption is needed but when the complexities of the absorptive mechanism and the numerous factors involved are considered, the difficulties in devising such a test are many. The flat glucose tolerance curve obtained in coeliac disease and allied states is well-established. The galactose absorption test seems to hold out the best possibilities, because the absorption of galactose like that of many foods is not a simple process of diffusion but involves the specific chemical mechanism which VERRAR has ascribed to phosphorylation as galactose does not normally occur in the fasting blood, but after oral ingestion is absorbed in the small intestine passing into the portal blood, being converted in the liver to glycogen. When present in the blood it is excreted by the kidneys and, contrasted with glucose there does not appear to be any threshold concentration below which excretion does not take place.

The method of blood galactose determination depends upon its estimation as non-fermentable reducing substance. The difference between this latter in fasting blood and that after ingestion of galactose is used as a measure of this carbohydrate. By use of a special galactose-fermenting yeast it is possible to identify as galactose the increase in the non-fermentable reducing fraction of blood following galactose ingestion. As the result of preliminary studies 0.6 gm. of galactose per kgm. body weight was employed and this quantity gives adequate blood galactose level in normal subjects and provides a range of concentration which enables rapid and decreased absorption to be detected.

In radiographic studies on patients in this series increased motility was observed in one patient only. Two with pellagra and all with non-tropical sprue showed changes in the small intestine characteristic of deficiency disease such as disturbances of the mucosal pattern with variations in size and contour of the lumen but none was observed in cases of pernicious anaemia or ariboflavinosis.

All patients with active pellagra showed evidence of impaired absorption and gave positive evidence that this constitutes one of the physiological disorders of this disease. There is evidence too that response to therapy is accompanied by increased absorption. All sprue patients gave evidence of impaired intestinal absorption.

Improvement of absorption accompanied clinical improvement in pellagra but not in sprue (in fact the form we recognize as idiopathic steatorrhoea). Two out of four cases of rosacea keratitis responding to riboflavin therapy gave indications of decreased absorption which improved after the disappearance of the keratitis but approximately one half of the patients with pernicious anaemia showed impaired absorption which did not run parallel with changes in the blood condition suggesting a secondary factor involved in absorptive changes.

P Manson Bahr

DEENEY (James) *Pellagra in General Practice in Northern Ireland.*—
Brit Med J 1942. Jan 31 pp 157-158

Reports from the whole of Ireland show only 4 cases of pellagra in the period 1935-39 but the author describes in this paper 16 which have come under his own care in Northern Ireland giving details of each. In the majority cure was effected by nicotinic acid [but the results might have been still better had riboflavin been added]. It seems therefore that pellagra is relatively common but is not usually recognized and that it is usually diagnosed as neurasthenia, dyspepsia or eczema. The diets of the patients are stated to have been inadequate or unbalanced.

C IV

MINNICH (Virginia) WEIGHT (Sydney T) MOORE (Carl V) & SPIES (Tom D) *Whole Blood and Plasma Ascorbic Acid Concentrations in Patients with Pellagra and Associated Deficiency Diseases*—
Proc Soc Experim Biol & Med 1940 Oct Vol 45 No 1
pp 441-446 With 1 fig [10 refs.]

A study of 70 patients attending the Nutrition Clinic, Hillman Hospital Birmingham Alabama and 20 controls.

Nearly all the patients had already suffered from pellagra beriberi or other deficiency condition. Their diet was generally lacking in vitamin C during the greater part of the year.

The ascorbic acid content of whole blood or cells was determined by the methods of BUTLER and CUSHMAN (1940) and MINDLIN and BUTLER (1938). The content of plasma is unreliable as it changes quickly with change of diet.

For controls the figure obtained was 0.05 to 1.46 mgm per cent with an average of 1.20. The average for the patients was 0.63 mgm per cent. Among the 70 cases only 15 had a content within normal limits on the other hand only 8 showed advanced depletion i.e. a figure below 0.3 mgm.

There were no significant differences between cases exhibiting symptoms of one or other of the vitamin B syndromes. The general conclusion is that partial depletions of vitamin C are commonly associated with other deficiency states. *H S Stammers.*

SWAMINATHAN (M.). Further Studies on the Cyanogen Bromide Method of estimating Nicotinic Acid in Biological Materials.—*Indian J Med Res.* 1941 Apr Vol 29 No. 2 pp 325-340 With 3 figs [22 refs.]

GIRI (K. V.) & NAGARAJA (B.) An Adsorption Method for the Estimation of Nicotinic Acid Content of Animal Tissues and Blood.—*Indian J Med Res.* 1941 July Vol 29 No. 3 pp. 585-590.

MEULENGRACHT (E.) & BICHEL (Jörgen) Riboflavin-Avitaminose und das Plummer Vinson-Syndrom (Riboflavin Deficiency and the Plummer Vinson Syndrome).—*Klin Woch.* 1941 Aug 16. Vol 20 No 33 pp. 831-834 11 refs.]

These authors surmised that in the ariboflavinosis symptom-complex they could detect resemblances to the Plummer Vinson

BICHEL (Jørgen) & MEULENGRACHT (E) Pellagra entstanden nach Behandlung des Plummer Vinson Syndroms mit Riboflavin. [Pellagra, Results of the Treatment of the Plummer-Vinson Syndrome with Riboflavin.]—*Klin Woch* 1941 Sept 6 Vol. 20 No 36 pp 913-914

In an experimental trial of treatment of the Plummer Vinson syndrome with riboflavin these authors were able to observe the supervention of characteristic pellagrous skin changes shortly after cessation of treatment. This phenomenon which has never in their experience been previously recorded appeared to be analogous to the pellagrous manifestations which may superimpose themselves in patients too energetically treated with vitamin B₁ whether they have exhibited the corresponding signs of this avitaminosis or not. Furthermore LEHMANN and H. NEILSEN have shown that on subsequent medication with a polyvalent B-vitamin preparation the pellagra disappeared. A further example quoted by SALVESSEN occurred in a woman with osteosclerotic anaemia treated with heroic doses of vitamin B₁ whereupon pellagra made its appearance also. Another similar instance after vitamin C therapy.

The patient in question was a woman of 62 treated early in 1940 who after gastroenterostomy for gastric ulcer in 1919 developed the Plummer Vinson syndrome with glossitis angular stomatitis oesophageal stenosis and secondary anaemia. Treatment was instituted with injections of riboflavin 7 mgm daily for 42 days. Fourteen days later typical pellagrous pigmentation became visible on the dorsal aspect of both hands although glossitis and angular stomatitis disappeared after eight riboflavin injections. Pigmentation was also seen on both cheeks in the nasal and circumoral regions and paraesthesia of both feet was subsequently noted. All these pellagrous manifestations yielded to a polyvalent vitamin B preparation (Becoplex). It is possible to offer several explanations of this curious sequence. There may have existed a pellagrous diathesis in this case originating in dietetic restrictions prior to hospitalization which was in the process of development or it may be that vigorous vitamin B₁ therapy so seriously unbalanced the basal metabolism as to bring about the pellagrous syndrome.

LEPORE (Michael J) & GOLDEN (Ross) A Syndrome due to Deficiency of the Vitamin B Complex.—*Jl Amer Med Assoc* 1941 Sept 13 Vol 117 No 11 pp 918-923 With 5 figs [Summary appears also in *Bulletin of Hygiene*]

A diet high in carbohydrate and deficient in the vitamin B complex protein fat and sometimes calories produces a syndrome which is not classical pellagra ariboflavinosis beriberi or sprue. Thirty ambulatory patients were studied. The main clinical features were weight loss asthenia, anorexia irritability and personality changes weakness and faintness 2-4 hours after meals constipation or diarrhoea and a highly irritable gastro-intestinal tract. A flat oval dextrose curve was common. The small intestine showed X ray changes ranging from motility disturbances and abnormal mucosal pattern to mucosal atrophy. Sedation and psychotherapy were without effect but the condition responded to treatment with the whole vitamin B complex. Oral therapy was occasionally unsuccessful this may be related to the

fact that many patients showed achlorhydria or hypochlorhydria for there is evidence that vitamin B₁₂ is protected by the gastric acidity. Capillary fragility was common and responded to therapy with a yeast syrup. Steatorrhea was absent. Patients with severe small intestine changes responded best to parenteral administration of the B complex or crude liver extract. In oral therapy better results were obtained with the yeast syrup than with capsules containing concentrated B complex. Early treatment is important otherwise changes in the small intestine may become irreversible. *H N Green*

KUO (P T) & HUANG (M S.) Nutritional Stomato-Glossitis among the War Refugees in Shanghai.—*Chinese Med J* 1941 May Vol 59 No 5 pp 430-440 With 6 figs. on 2 plates. [20 refs.] [Summary appears also in *Bulletin of Hygiene*]

Owing to the inadequate diet (consisting almost wholly of plain rice or congee) of the refugees for the last 2 years, stomato-glossitis, which was rare in China, is now common. In 6 months, 237 cases were seen in one hospital and detailed accounts of 18 severe cases are given. Six types of glossitis were observed—marginal inflammation, indentations of the tongue, generalized inflammation, partial atrophy, total atrophy, and pellagrous stomatitis. Of these 18 patients, 13 had acute or chronic beriberi, 10 had nutritional oedema with low serum proteins, two had the ophthalmic and cutaneous lesions of vitamin A deficiency, and one possibly had avitaminosis C. A diet containing beef, pork, eggs, green vegetables, liver, beans and bean curd was given but owing to the extremely poor appetites of most of the subjects no improvement occurred until vitamin preparations were given parenterally. The fiery colour which distinguished the pellagrous tongue disappeared within 48 hours of the administration of nicotinic acid but the atrophic condition which remained disappeared only when the other deficiencies in the vitamin B complex were rectified. An account is given of the clinical course, the quantitative changes in the blood haemoglobin, reticulocytes, red cells and serum proteins, and of changes in the bone marrow in 15 cases of atrophic glossitis (usually accompanied by cheilosis) which were treated parenterally with liver extract. Three of these cases were previously treated unsuccessfully with nicotinic acid. The cheilosis did not heal as quickly as the glossitis but it eventually improved as the appetite of the patient increased. *H N Green*

NICHOLLS (Lucius) Crazy Pavement Skin Eruption.—*Trans Roy Soc. Trop Med & Hyg* 1940 Nov 30 Vol. 34 No 3 pp. 291-292 With 2 figs. on 1 plate

Dr Nicholls describes and gives an excellent photographic illustration of two patients showing "crazy pavement" skin the result of fissuring [see also this *Bulletin* 1934 Vol. 31 p. 344]. One was a man of 35 years with oedema of the legs and the skin over the anterior surface finely and irregularly fissured. He had suffered from nephritis for two years. The second was a man, 30 years of age suffering from phthisis. Both legs (but only the legs) showed patches of epithelium darker than normal and separated by fissures. Inquiry did not reveal any marked dietary deficiencies. These cases and others bearing some resemblance to them have been grouped together under

the term pellagroid and the author urges that we have no right to do this on such inadequate grounds. It may be he states, that in such cases as these there has been deficient absorption or faulty metabolic utilization of certain vitamins but in the present state of our knowledge we are not justified in making assumptions of this kind still less to diagnose all such cases as pellagra mainly on the existence of a crazy pavement eruption — a conclusion with which most tropical practitioners will agree. H H S

RIDDLE (Jackson W) SPIES (Tom D) & HUDSON (N Paul) A Note on the Interrelationship of Deficiency Diseases and Resistance to Infection.—*Proc Soc Experim Biol & Med* 1940 Oct Vol. 45 No 1 pp 361-364 [12 refs.]

Summary and Conclusions—1 Our observations in 150 patients from a region of Alabama in which deficiency diseases are endemic show a relationship between these diseases and the resistance to and presence of infections with *Staphylococcus aureus* and *Streptococcus hemolyticus*. 2 The lesions at the corners of the mouth characteristic of riboflavin deficiency contained pure or nearly pure cultures of hemolytic strains of *Staphylococcus aureus* in 80% of the cases and in the remaining 20% *Streptococcus hemolyticus* predominated. Following the oral or intravenous administration of riboflavin or substances rich in it the fissures healed rapidly and the organisms were no longer demonstrable. 3 When the bacterial flora of the conjunctival sacs were studied in cases of dietary deficiency disease and associated conjunctivitis hemolytic strains of *Staphylococcus aureus* were found to predominate in 14 of the 30 cases. Smears and cultures demonstrated the presence of *Corynebacterium xerosis* in a pure state in all of the spots of Bitot which occurred in 5 cases. 4 In addition to masses of Vincent's organisms 64% of the ulcerations of the tongue gums or buccal mucosa yielded *Streptococcus hemolyticus* and the remaining 36% contained hemolytic strains of *Staphylococcus aureus*. Following specific therapy with antipellagric substances the bacterial flora of these ulcerations including the Vincent's organisms promptly disappeared. 5 A low complement titre exists in acutely deficient patients, and in the subclinical and mild cases the titre is slightly subnormal or normal. Following clinical improvement the complement titre increases. 6 In the whole blood of acutely deficient patients there is a distinct depression in the bactericidal power for *Staphylococcus aureus* whereas only a slight diminution in staphylococidal power was observed in the blood of subclinical and mild cases of vitamin deficiency.

EPIDEMIC DROPSY

MUKHERJI (S P) LAL (R. B) & MATHUR (H. B L) Investigations Into the Epidemiology of Epidemic Dropsy Part XII. Isolation of Active Substances from Toxic Oils.—*Indian J Med Res* 1941 Apr Vol 29 No 2. pp 361-365 With 1 plate

The authors have followed up their investigations into the aetiology of epidemic dropsy and have produced another paper of great interest. In 1940 [see this *Bulletin* 1941 Vol 38 p 288] they described a

method for isolating a substance which will indicate the amount of argemone oil present in mustard oil, and they suggested that the toxicity of the oil corresponded with its content of this substance. In the present paper they describe a simple process for obtaining this from the oil, in the following words —

One hundred c.c. of oil, 25 c.c. to 30 c.c. of absolute alcohol and 25 c.c. to 30 c.c. of saturated solution of caustic potash are vigorously shaken together. To accelerate the process of saponification the mixture is heated to just below 100°C for half to one hour. It is then allowed to cool. Equal amount of distilled water is added and the emulsion is left undisturbed for a few days. Small shining mica-like crystals soon appear which separate out on further dilution with distilled water and are slowly deposited at the bottom of the vessel. The rate of crystal formation increases if the mixture is kept in the refrigerator.

To obtain the crystals the emulsion is filtered through a filter-paper. The crystals are repeatedly washed with distilled water to remove the soap. Being soluble in hot alcohol and only partially soluble in cold, they are purified by dissolving in hot alcohol and re-crystallizing by cooling. The substance is then dried in hot air-oven at 50°C to 60°C and finally under vacuum at 100 C until constant weight is maintained."

They go on to describe its physical and chemical properties and its composition from microchemical analysis. Its empirical formula is $C_{22}H_{32}O_4N$. Its biological properties are to form the subject of a later communication.
H H S

LAL (R. B.) DAS GUPTA (A. C.) AGARWALA (S. P.) & ADAK (B.)
Investigations into the Epidemiology of Epidemic Dropsy. Part
XIII. Application of the Biological Test to Modified Argemone
Oil and its Derivatives.—*Indian Jl Med Res* 1941 Oct. Vol. 29
No. 4 pp 813-838. With 9 charts.

The authors, continuing their experiments on the toxicity to rats of mustard oil or its adulterants, have fed these animals on a basic diet and added different extracts of the oil—the white crystalline substance, the crystalline free base, the residue of argemone oil after abstraction of this base dissolved in pure mustard oil, and argemone oil modified by treatment with light. The number of animals used for each test was small, usually 2 or 3 and never more than 5 in a group, but from the post mortem findings the authors conclude that the white crystalline substance and the crystalline free base (to a less degree) have a poisonous effect when added to the basic diet of rats. Argemone oil after removal of the crystalline free base or exposure to light becomes biologically inactive, but addition of the white crystalline substance restores the toxicity. Controls fed on pure mustard oil showed no poisonous effects. Tables and charts are given showing details of the growth rates and histological findings in all the experiments mentioned in the text.
H H S

LAL (R. B.) DAS GUPTA (A. C.) MUKHERJI (S. P.) & ADAK (B.)
Investigations into the Epidemiology of Epidemic Dropsy. Part
XIV. Feeding Experiments on Human Subjects to test the
Toxicity of Some of the Derivatives and Modifications of Argemone
Oil.—*Indian Jl Med Res* 1941 Oct. Vol. 29 No. 4 pp 839-
849

Three feeding experiments with a small number of volunteers are recorded in this article. The first was to establish whether the

crystalline free base of argemone oil was toxic. The second was to test the toxicity of this base and of the white crystalline substance and of the oil after light treatment. The volunteers for this test were divided into six groups. I Received 5 per cent mixture of light treated oil of argemone in pure mustard oil. II The same *plus* crystalline free base equivalent to 5 per cent argemone oil. III Received the white crystalline substance in pure mustard oil equivalent to 5 per cent argemone oil. IV Five per cent argemone oil in pure mustard oil, with the crystalline free base removed. V The same *plus* the free base equivalent to 5 per cent argemone oil. VI Positive controls with 5 per cent argemone oil.

The fifth group was devised to test whether if the crystalline free base was itself non toxic removal of the crystalline free base left a radicle which itself non toxic might re-combine with the base to form a toxic substance.

The third experiment was to feed three volunteers for 23 days with food containing 5 per cent mixture of argemone oil after subsection to light treatment in pure mustard oil to which the white crystalline substance had been added equivalent to 5 per cent argemone oil. In this time each volunteer consumed 45 ounces of oil.

The control group (VI) of the second experiment proved the part taken by argemone oil in causing epidemic dropsy but the actual toxic principle is not yet determined. Fractions obtained have not proved toxic the residue after extraction with HCl is not toxic to man exposure to light deprives the oil of its toxicity. In the authors words

Although some suspicious signs and symptoms were produced by w.c.s. [white crystalline substance] and c.f.b. [crystalline free base] fractions of argemone oil they were not sufficiently grave to justify being labelled as epidemic dropsy. In this respect the chemical and the biological tests failed as complete tests of toxicity. Since however these purified fractions are not likely to be met with in oil as sold in the market, the practical value of either test does not suffer in any way. Since both the isolated fractions and the residue left after extraction of c.f.b. are non toxic the simple inference that may be drawn is that the latter constitutes only a part of the toxic molecule found in argemone oil. Since however addition of c.f.b. or w.c.s. to the residue left after the extraction of the former fraction does not result in a toxic product it may be argued that non toxicity of the residue or of the fractions is due to modification of the toxic substance rather than to its being split up. While we are not in a position to dispute this possibility the separation of c.f.b. by a relatively gentle treatment would support the hypothesis of splitting rather than of radical modification especially when it is remembered that the toxic substance in the oil is able to withstand heating to the high temperatures involved in cooking food. The simple process of mixing the c.f.b. or w.c.s. with the residue may lack the necessary chemical energy to effect re-combination into the original toxic substance or loss of some constituent which might have occurred during the process of isolation of c.f.b. may explain it.

H H S

GROSH (Jaharlal) & ROY (Bidhubhusan) *Clinical Aspects of Epidemic Dropsy (Observations on 154 Cases)*—*Calcutta Med Jl* 1941 Mar Vol 38 No 3 pp 115-124 With 1 chart

This is purely a clinical study of epidemic dropsy and does not bring forward any new observations—it does not profess to do so. The authors have noted carefully the symptoms of this disease and their relative incidence in 154 cases. As regards season most (but number

not stated] were seen in the third quarter of the year and in August more were recorded than in any other month. Forty-two occurred in the second decade, 50 in the third—the youngest patient was three years old—72 were males 82 females. Sixty-four of the patients (41 per cent.) gave a history of previous attacks [but this fact alone does not justify the authors' conclusion that one attack definitely predisposed to subsequent attacks]. Several cases might occur in the same family in one instance as many as five. The incubation period is short—it may be within a week and the minimum may be only three days. By this the authors mean that symptoms appeared within this period of arrival from a place where it was not known to be present. Of the symptoms oedema was the commonest, being seen in 145 cutaneous manifestations, from flushing and hyperpigmentation to red spots and sarcoids, were present in 115 (74·7 per cent.) and sarcoids themselves in 44 (28·6 per cent.). More than half 88 or 51·4 per cent. suffered from diarrhoea. Cardiovascular signs were common—palpitation was complained of in 111 cases, praecordial pain in 95 dyspnoea in 78 gallop rhythm was noted in 36. Haemorrhage was a feature in 43 cases (27·9 per cent.). Twenty had bleeding from the gums, five had haemoptysis three epistaxis, two bleeding from sarcoids. Others had menorrhagia (15) and fourteen had bleeding from the bowel some due to haemorrhoids, which, in some cases at least the authors think are closely associated with epidemic dropsy.

H H S

RELAPSING FEVER.

STANUŠ (Hugh S) & BENDIT (Maximilian) Relapsing Fever—*Lancet* 1942. Jan. 24 pp 103-104

The case described is that of a Belgian aviator who reached Britain after undergoing imprisonment in Spain and after a journey across that country lasting for about one month. The diagnosis was confirmed by blood examination and the disease came to an end after the third febrile attack—no treatment was given. In the discussion it is pointed out that the disease was, on the whole mild and resembled the tick borne form seen in Spain and transmitted by *Ornithodoros maroccanus* or *O. exoticus* rather than the severe louse-borne form. The patient had been infested with lice in Spain and had no recollection of any tick bite but the authors think it probable that this was a case of tick-borne rather than louse-borne disease.

C IV

ANDERSON (Ch.) BERGE (Ch.) FAUCONNIER (H.) & RUKACHIER (A.) Etude d'un foyer de fièvre récurrente hispano-africaine dans la région de Bizerte-Ferryville-Mateur (The Study of a Centre of Spanish-African Relapsing Fever in the Neighbourhood of Bizerta Ferryville-Mateur)—*Arch Inst Pasteur de Tunis* 1941 June. Vol. 30 No. 1-2 pp 118-128. With 1 map [33 refs.]

During the routine examination of slides from febrile cases during the last two months, the authors came across five cases showing relapsing fever spirochaetes. All five patients came from the neighbourhood of Bizerta to Mateur. It is of interest that since 1933 no case of the disease had been reported from this district.

Clinical details are given of these five cases from four of which spirochaetes were isolated and studied in laboratory animals. None of the patients was infected with lice and since an examination of burrows in the district resulted in the discovery of *Ornithodoros erraticus* it is to be presumed that this tick was responsible for the outbreak.

A study of the four strains showed that rats were only slightly susceptible whilst on the contrary guineapigs were highly susceptible recalling the effects of *Spirochaeta hispanica*. Cross immunity experiments against both *S. duttoni* and a Tunisian strain of *S. hispanica* gave negative results and each of the two local strains which were tested failed to vaccinate against the other. These results confirm previous experience as to the extreme specificity of these strains when studied by cross immunity tests

E Hindle

ORDMAN (David) The Occurrence of Relapsing Fever and the Geographical Distribution of *Ornithodoros moubata* in South Africa With an Account of Investigations carried out in the Northern and Eastern Transvaal.—*South African Med J* 1941 Oct 11 Vol. 15 No 19 pp 383-388 With 1 map

An account of the distribution of tick relapsing fever and *Ornithodoros moubata* in the Union of South Africa.

This disease was first reported from South Africa by Park Ross in 1912, who saw cases in Zululand and then there are no further published records until 1932 since when numerous cases have been recorded. *Ornithodoros moubata* is widely distributed in the Northern Transvaal and cases of relapsing fever occur frequently among the natives. The tick is also present in the Eastern and Western Transvaal but only occasional cases of relapsing fever have been reported from these districts. Some of these cases have probably not been locally infected but were imported infections from endemic territories outside the Union of South Africa. In this connexion the author mentions that in Nyasaland the Angoni take a supply of ticks with them when they are likely to be away from home for a long period since these natives believe that immunity can only be maintained if they are bitten from time to time by ticks. This practice may explain the ubiquity of these ticks in Nyasaland and also may well lead to the infestation of mine compounds employing Angoni workers. It is recommended that in the erection of compounds for the housing of native labourers, special measures should be taken to prevent the possibility of tick infestation.

The distribution of *O. moubata* shown on a map is largely in the northern and eastern parts of the Union of South Africa, adjoining Bechuanaland Southern Rhodesia and Portuguese East Africa. Although relapsing fever is at present not of major importance in South Africa the possibility of further outbreaks especially among aggregations of natives in mines and works cannot be overlooked [See also this *Bulletin* 1940 Vol. 37, pp 198 638]

E H

DAVIS (Gordon E.) *Ornithodoros turicata* and Relapsing Fever Spirochaetes in New Mexico.—*Public Health Rep* 1941 Nov 21 Vol. 56 No 47 pp. 2258-2261 With 1 fig

A rapid tick survey of 10 counties in southern and south-eastern New Mexico resulted in the collection of 604 *Ornithodoros turicata*

belonging to 41 lots. The ticks were collected from borrow pits at the sides of the road, occupied by cotton-tail rabbits, other rodents and birds also from kangaroo rat mounds and three from a prairie dog burrow and three beneath a rock. A total of 539 ticks arrived alive at the laboratory and these were tested for spirochaetes. Eight lots representing Roosevelt, Chaves, Lea and Hidalgo Counties, were found to harbour relapsing fever spirochaetes. In addition relapsing fever was contracted by a boy from California staying at a cattle ranch in Chaves County in 1936 which seems to be the first record of the disease in New Mexico. E H

DAVIS (Gordon E.) *Ornithodoros parkeri* and Relapsing Fever Spirochaetes in Utah.—*Public Health Rep* 1941 Dec 26 Vol. 56 No. 52 pp. 2464-2468 With 1 fig

This is a note to report the finding of spirochaetes of relapsing fever in *O. parkeri* found in the Uintah, Carbon, Emery and Grand Counties of Utah. Previously two cases of human relapsing fever had been reported from Utah. Most of the ticks were collected from the burrows of prairie dogs but it is known that they inhabit the burrows of ground squirrels and burrowing owls also. C IV

FELDT (Adolf) Die Chemotherapie der Recurrenzinfektion mit Gold und Sulfonamidverbindungen. [The Chemotherapy of Relapsing Fever with Gold and Sulphonamide Compounds].—*Arch. Woch.* 1941 Sept 20 Vol. 20 No. 38 pp. 945-949 With 1 fig [50 refs.]

The author has made comparative studies of the effects of gold compounds, especially gold keratinate and sulphonamide derivatives, using mice infected with various strains of relapsing fever spirochaetes including —*S. recurrentis hispanica usbekistanica novyi* and three strains of *duttoni*.

The results of treatment with arsenobenzol, the earlier gold preparations Solganal and Neo-solganal and gold keratinate are given in tabular form showing the doses for curing acute infections, the prevention of relapses, and residual brain infections, respectively. Gold keratinate has a therapeutic index of 1/100 to 1/250 for the acute infection, prevents blood relapses with doses having an index of 1/8 to 1/20 and produces complete sterilization in doses of 1/6 to 1/15. The respective doses for ordinary Solganal are nearly 15 times as much and with arsenobenzol it is not possible to prevent relapses and brain infections.

Gold and arsenic compounds are found to be most effective if administered near the crisis of the infection. Large toxic doses are not so good as smaller amounts, which can be well borne.

Large doses of sulphapyridine and sulphathiazole administered either orally or subcutaneously cause the disappearance of spirochaetes from the blood of mice infected with relapsing fever but the animals are not sterilized. The action of these compounds on streptococci and pneumococci in mice is completely neutralized by p-amino-benzoic acid but with relapsing fever infections this acid increases the effect of the compounds.

The effect of Neo-solganal on streptococci, pneumococci and relapsing fever spirochaetes is not affected by p-amino-benzoic acid.

Neosolganal and sulphonamide compounds show considerable overlapping in their therapeutic action on relapsing fever and coccal infections and the author recommends that combinations of these two series of compounds should be used in the treatment of bacterial and also virus infections.

In an appendix details are given of the results of treating three paralytic patients infected with *S. hispanica* by intravenous injections of 1 gm neo-solganal in T C 6 (a solution of calcium thiosulphate). In each case the fever disappeared within 3 to 8 hours. E H

RAT BITE FEVER

BRAZZAVILLE [AFRIQUE FRANÇAISE LIBRE] RAPPORT SUR LE FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR EN 1940
[CECCALDI (Jean) Director] pp 30-44 —Sodoku

An account of a typical case of rat-bite fever at Brazzaville the first to be recorded from French Equatorial Africa.

Two guineapigs and two mice were inoculated intraperitoneally with blood from the patient four weeks after he had been bitten by a rat and *Spirillum minus* appeared in the blood of both mice and a guineapig. Its pathogenicity was also tested in rabbits monkeys (*Cercopithecus neglectus brachycephalus*) fowls a dog and a cat. The particular susceptibility of the first three suggests that the strain isolated possessed a high virulence.

Attempts to culture the organism were unsuccessful. When inoculated into guineapigs simultaneously with *Trypanosoma gambiense* the appearance of trypanosomes in the blood was delayed suggesting an antagonistic action between the two infections.

E Hindle

SAVDOOR (S. R.) & LEWTHWAITE (R.) The Weil-Felix Reaction in Experimental Rat-Bite Fever—*Brit Jl Experim Path* 1941
Oct Vol. 22. No 5 pp 274-292. With 3 figs. [15 refs.]

The authors find that the sera of rabbits infected with uncontaminated strains of *Spirillum minus* (rat bite fever) develop agglutinins for the OXA strain of *Proteus* in much higher titre than after infection with *Rickettsia tsutsugamushi*.

The suspicion that strains of rat-bite fever might give a Weil-Felix reaction of the OXA type arose from the study of two murine strains of typhus-like fevers contaminated with *S. minus* and another strain supposed to be typhus but which proved to be only this spirillum. Later a study of three human and two murine strains of rat bite fever from which any possibility of a contaminating typhus-like infection of *Proteus* could be definitely excluded confirmed these results. Three of these strains were carefully studied for evidence of contamination with *Proteus* bacilli but none was found moreover the inoculation of normal guineapigs with *Proteus* OXA bacilli was not followed by infection or bacteraemia. These facts show that contamination with *Proteus* OXA bacilli could not be a source of the high OXA agglutinins

MISCELLANEOUS

MANSON BAHK (Clinton) Diseases of East Africa.—*Lancet* 1942. Feb. 14 p. 217

Major Manson-Bahr notes that although the malaria of the area Diredawa to Awash and of the Omo river district is predominantly subtertian, there is undoubtedly benign tertian in Addis Ababa. He reports an outbreak of kala azar in a company of the King's African Rifles stationed north-east of Lake Rudolf in a completely uninhabited area where there are no natives or dogs. He has also found the disease at Garba Tulla in the Northern Frontier Province of Kenya. Louse-borne relapsing fever is very severe and has caused many deaths in native troops. Typhus in Addis Ababa is all louse-borne but the Italians report that the case mortality is not high being in the neighbourhood of 30 per cent. Murine typhus is reported in Southern Abyssinia and there is a record of one case of tick-borne typhus probably contracted in Somaliland.

Bacillary dysentery was found near Mogadishu and in Addis Ababa and amoebiasis occurs around Addis Ababa. Soft sore is the commonest venereal disease but lymphogranuloma inguinale occurs in the Negheli region. Granuloma venereum is reported from the Gondar region and Western Abyssinia. An Italian laboratory worker states that he has not seen *Schistosoma mansoni* in Abyssinia. [See also this *Bulletin* 1941 Vol 38 p 529.] C II

DENECKE (Karl) Betrachtungen ueber Häufigkeit und Verlauf von Krankheiten bei den Eingeborenen der Guineabucht (Westafrika). [The Frequency and Course of Diseases of the Natives of the Gulf of Guinea].—*Arch f Hyg u Bakt* 1941 Vol 128 No. 5/6. pp 331-348 [30 refs.]

The author spent some year in Fernando Po and Rio Muni, and the present paper is a compendium of the diseases seen in those parts. Skin diseases are common, especially mycoses, tropical ulcer, craw-craw and creeping eruption due to larvae of the dog hookworm [*Ancylostoma brasiliense*? *A. caninum*]. Leprosy of all forms is common in Rio Muni, sporadic in Fernando Po. yaws is widely spread. Dengue common in the Gold Coast and the Cameroons, was seen in Fernando Po but only in Europeans. Measles is rare, smallpox is present but is declining, whooping cough was occasionally seen. Diphtheria was not encountered, but almost all persons Schick tested showed evidence of immunity the origin of which is obscure. No scarlet fever was seen.

Of bone diseases, sabre tibia, the result of yaws, is common, the nasal signs of congenital syphilis are not rare, osteomyelitis, often from tropical ulcer is seen, and tuberculosis of the vertebrae is not uncommon. Of joint diseases, rheumatic polyarthritis is the most frequent but the author has also seen arthritis deformans (sometimes the result of contusion), gonorrhoeal arthritis and arthritis due to yaws.

Tropical myositis is important, and occurs in natives and Europeans. Onchocerciasis and guinea worm are common, madura foot is occasionally seen, juxta articular nodes are found, and the formation of keloid, often of great thickness, is common. Various neurological diseases are reported, and the author remarks that the late results of poliomyelitis are relatively frequently seen.

There is a high incidence of sleeping sickness in Fernando Po but it is less common in Rio Muni except in the south west. The author claims that the dog is a reservoir of sleeping sickness stating that he has proved this by injection of dog blood containing trypanosomes but gives no details of the experiment. Tetanus is not uncommon.

Of pulmonary diseases bronchitis bronchopneumonia, influenza and lobar pneumonia are common and the author states that damage to the lungs by larvae of hookworms *Ascaris* and *Strongyloides* are to be borne in mind. Pulmonary tuberculosis was rare in Fernando Po until about ten years ago since when it has spread [but the author's remarks on the incidence of tuberculosis in Africa are curious. He states that it is rare in Sierra Leone and the Gold Coast and quotes KLEINE as remarking that in East Africa it is only found in adult natives who work on the coast or on plantations. Neither of these statements is justified].

Cardiac lesions the result of rheumatic fever and syphilis are found, and hookworm anaemia produces an effect on the heart sounds. Rheumatic fever is an important disease in the natives.

The enteric fevers and dysentery are not often seen but bacteriological examination of faeces could not be carried out. Non infectious diseases of the alimentary tract are common and are stated to be due largely to the use of contaminated food and water. Amoebic dysentery exists but is not common. Intestinal flagellates are seen. Intestinal helminthic infections are reported to be somewhat rare in Rio Muni. Schistosomiasis was not seen. A *persiana* infection was found in about half the natives examined and *L. loa* in about one third. *W. bancrofti* is less common. Yellow fever has not been seen by the author in either Fernando Po or Rio Muni.

Venereal diseases are widespread. Malaria is very common but immunity is acquired before adult life is reached. Blackwater fever was not seen. Most of the infections are with *P. falciparum* but *P. vivax* is also seen. The parasite rate falls from 60-100 per cent in infancy to a low percentage in later life. The common snakes of Fernando Po are *Naja melanoleuca*, *Dendraspis viridis* and *Bitis gabonica*.

Enlarged lymphatic glands are common and are due largely to trypanosomiasis lymphogranuloma inguinale and filariasis. C II

PRASAD (Kashu) Bored Hole Absorption Pits.—*Indian Med Gaz* 1941 Oct Vol 76 No 10 pp 627-628 With 1 fig

The bored hole 20 feet deep and 16 inches in diameter is the same whether used as latrine or as suggested by the author as absorption pit. He points out the advantage of ease of construction which makes the pits suitable for villages. The limitations are that they can only be made where the soil is not rocky. They should not be placed within 4 feet of any wall, which may collapse during the rains. One pit can absorb only 10-15 gallons each day but if rainwater is not permitted to enter it will last several years before silting makes it unusable. The walls may cave in after the reception of much water but this may be prevented by partially filling with broken bricks which do not interfere with absorption. A suitable top is essential with a drain of masonry of saucer type the spout projecting over the centre of the pit so that water falls not on to the wall to cause erosion but directly into the pit. Storm water should be led away from the pit if necessary by closing the

drum to the pit. The mouth of the pit should be covered to prevent children and animals from falling into it preferably by a moveable cement slab resting in a masonry ring.
Cost of construction and details of the outfit are given. C IV

FACET (Ernest Carroll) The Chemotherapy of Intestinal Parasites.—*J Amer Med Assoc* 1941 Oct. 18. Vol. 117 No. 16. pp. 1331-1335 [31 refs.]
A general account of the treatment of certain common helminthic diseases and intestinal protozoal infections. C IV

PUBLIC HEALTH REPORTS 1940 Supplement No. 161 8 pp. With 4 figs. on 2 plates.—Ivy and Sumac Poisoning

HOFFMAN (W. A.). The Effect of Chloroform on Some Insect Bites.—*Science* 1941 July 18 Vol. 94 No. 2429 p. 68.

Chloroform, rubbed briskly on mosquito bites causes rapid cessation of the pruritus a similar effect was obtained with this treatment of the bites of *Trambocula*, *Simulium* and *Culicoides*. It is most effective when applied early but brings relief even after 48 hours. It is, of course important to keep the chloroform away from the eyes and mucous membranes. C IV

DE MEILLOS (Botha) & RENFELD (Antonio) Colleini (Diptera, Nematocera) from the Colony of Moçambique.—Reprinted from *Moçambique-Documentário Trimestral* 1941 July-Sept No. 27 pp. 69-77

This contains very brief statements of the frequency and distribution of the mosquitoes in the Colony of Moçambique. C IV

BATES (Marston) Laboratory Observations on the Sexual Behaviour of Anopheline Mosquitoes.—Reprinted from *Jl. Experim. Zool.* 1941 Mar Vol. 66 No. 2 pp. 183-173. [18 refs.]

VISO (Flavio L.). Miasis por larvas de *Cochliomyia hominivorax* (Coquerel, 1858), complicando un cáncer de labio (Nota parasitológica). *Revista de la C. Acroniavox Complicating Cancer of the Lip.*—*Bol. Inst. Clin. Quirúrg.* Buenos Aires 1941 June-July Vol. 17 No. 141 pp. 310-316 With 10 figs. [33 refs.]

VAJERA ANGULO (Luis). Aparato para capturar Phlebotomus, Mosquitos, etc. [A Trap for Sandflies, Mosquitoes, etc.]—Reprinted from *Las Caxias* Madrid 1940. Vol. 5. No. 2 pp. 495-500. With 6 figs.

This is a description of a trap for catching mosquitoes and sandflies, in which advantage is taken of the attraction that light possesses for certain of these insects. Constructional details are illustrated. The main body of the trap constructed of wire gauze, measures 60 by 30 by 30 cm. In front the size of the entrance can be varied at will by the adjustment of flaps. At the back an electric bulb 100 watts, provided with a concave reflector is the source of illumination. In front of the bulb a flask filled with water acts as a cooler the water may be coloured if desired. In the bottom of the trap is a shallow tray to be

filled with a preserving fluid the fluid recommended is 70 per cent alcohol to which 5 per cent of glycerin is added *Norman White*

SCHLEGEL (B) Experimentelle Untersuchungen zur Besserung der Hitzeverträglichkeit des Menschen. [Experiments on the Improvement of Heat Acclimatization in Man.]—*Arch Woch* 1941 May 17 Vol. 20 No 20 pp 506-510 With 3 charts.

Variations in the heat regulation of the human organism have been studied with particular reference to the water and salt losses caused by high temperatures. The experiments described in the paper were conducted at a temperature approaching 40°C (104°F) and beneficial effects on the heat regulating mechanism were found to result from the administration of renal cortical hormone. Under the influence of the hormone there was an increase of water delivery through the skin with a proportional increase of salt delivery. This ability to sweat more freely tended to stabilize the circulation and thus contribute to a feeling of comfort in the subjects tested.

The experiments were timed to last for 120 minutes and in two series of tests (a) without and (b) with hormone administration it was found that in individual cases the increase in sweat loss under the influence of the hormone was considerable amounting to as much as 74 per cent. Six subjects were unable to continue the control experiments without hormone for the two hours and had to give up after periods ranging from 45 to 108 minutes (average 78 minutes). After receiving the hormone however these subjects carried out full 2-hour experiments without apparent discomfort. That this ability was due in some measure to an improvement in circulatory efficiency was shown by a comparison of pulse rates under the two conditions of experiment. Without hormone administration the pulse mounted rapidly at first and reached 140-150 per minute by the end of two hours but with hormone the pulse was steady at 90-90 throughout the experimental period.

The effect of hormone on the peripheral blood vessels was shown by measurements of the volume fluctuations in the arms in heat experiments before and after the administration of prophylactic doses. In the control experiments the volume change for five subjects averaged 66 cc. but in the hormone experiments the volume fluctuation for the same group of subjects averaged 55 cc.

The results obtained by this work indicate that acclimatization to a hot environment may be accelerated by the use of hormone

C G Warner

EARLE (H. Vigors) Medical Work in Maura.—*Med Press & Circular* 1942 Jan 21 Vol. 207 No 3 pp 38-40

HUFF (Clay G.) The Influence of Host Constitution on the Parasite.—Reprinted from *Amer Assoc for Advancement of Sci Publication No 12* pp 62-65 [23 refs.]

SALT (George) The Effects of Hosts upon their Insect Parasites.—*Biol Reviews*, 1941 Oct. Vol 16 No 4 pp 239-264 With 6 figs. [33 refs.]

[May 1942]

Tropical Diseases Bulletin

REVIEWS AND NOTICES

STRONG (Richard P.) (M.D., Sc.D., D.S.M., C.B., Professor of Tropical Medicine Emeritus Harvard University etc.). *Stitt's Diagnosis, Prevention and Treatment of Tropical Diseases*. Sixth Edition. Vol. I. pp. xv+1-871+xl. Vol. II. pp. vii+872-1747+xl. With 388 figs. & 4 plates (2 coloured) 1942. Philadelphia The Blakiston Company. Price \$21

This timely production under the editorship of Professor R. P. Strong represents the Sixth Edition of Stitt's former "Diagnosis and Treatment of Tropical Diseases," of which the last made its appearance in 1929. It is difficult to recognize such an old friend in a new garb, it is as if Stitt had now emerged from the downy stage to fully adult plumage. Not only has the arrangement been altered, but with increasing knowledge it has expanded into two volumes, each of over 800 pages, of which the latter portion of Vol. 2 is devoted to a series of appendices (in small type) and a consideration of hygiene in tabloid form.

Classification is arranged mainly on aetiology such as diseases due to protozoa, bacteria, viruses, rickettsiae, nutritional disorders, fungus-diseases and those caused by poisonous plants. A not inconsiderable section is devoted to animal parasites including helminths, injurious arthropods, poisonous fish, snakes and coelenterates. It will therefore be realized that the scope is ambitious and the very considerable labour in the preparation of this work will undoubtedly justify the praise which will be bestowed upon it.

To fill in details satisfactorily and accurately upon every question is probably beyond the scope of any single individual and in this respect the Editor has had the advantage of a strong backing. Dr G. C. SHATTUCK, Clinical Professor of Tropical Medicine, Harvard University has written the chapters on nutritional disorders and heat stroke. Dr A. W. SELLARDS and Dr Richard Pearson Strong, Associate Professor of Tropical Medicine have been responsible for the anthrax and so on. Dr J. C. BRISTOL has filled a similar office in entomology and parasitology. Dr J. C. BRISTOL has filled a similar office in entomology and parasitology. Dr J. C. BRISTOL has filled a similar office in entomology and parasitology. It is small wonder that with such well-known names a high standard of accuracy has been reached in every direction. The whole work repays ample study and there is much here for every worker in tropical medicine alike justifies a close and critical scrutiny and its importance to students, practitioners and research emulation, and in a detailed manner unsurpassed in any other medical publication. We note that *Plasmodium knowlesi* is included as a parasite of man on account of its therapeutic application and the chapter is so comprehensive as to include allied plasmodial infection of animals, but may be criticized on grounds that undue consideration for the apparently valueless Henry's reaction occupies no less than one and a half pages.

In logical succession this chapter concludes with a full account of the morphology and life history of Anopheles, a very considerable space being devoted to prophylaxis (a subject which will be referred to later) and the essentials of therapeutically induced malaria. The chapter on blackwater fever may be regarded as a modern detailed account of this puzzling catastrophe. African trypanosomiasis is singularly complete and well illustrated by distributional maps. A feature of the chapter

on leishmaniasis is the full consideration given to pathological appearances and histology with good illustrations of the lesions. In treatment no mention is made of the striking recent successes of diamidino-stilbene.

Leptospirosis is a rapidly changing subject. In one breath the identity is admitted of *L. grippotyphosa* and *L. icterohaemorrhagiae* but later it is suggested that they are distinct and, furthermore that the seven-day fever of Australia is due to *L. pomona* that of Japan to *L. hebdomadis* and the paradengue of Deli to *L. febrilis* (in parenthesis it may be added that Deli is in Sumatra not in Java). In the Yaws section Dr STRONG proves himself a worthy dualist (though in the heat of the controversy this word might have had a different spelling and application) but visceral vascular lesions are recognized as part and parcel of an uncomplicated infection with *S. pertenue*.

Pinta is frankly acknowledged as a treponematosis and is illustrated by good plates of *Treponema carateum* as well as by photographic illustrations of reproduction of this disease by inoculation.

The section on amoebiasis is very thorough and complete and we note that the use of intravenous emetine is discouraged. In the therapy of bacillary dysentery due credit is given to the modern application of sulphaguanidine. Cholera too is adequately handled. The chapters on plague and tularaemia can be singled out for the excellence of the clinical illustrations and of the postmortem appearances in animals. In leprosy we have a masterly account and in differential diagnosis due emphasis is laid on its distinction from tuberculosis, naso-oral leishmaniasis and syringomyelia. No special line of treatment is strongly advocated, all are detailed on the basis of pay your money and take your choice.

Volume II opens with a truly excellent account of yellow fever. The Rickettsia group receives generous treatment and includes trench fever, the product mainly of the American Trench Fever Commission in 1918 which for the first time is admitted to the hierarchy of Tropical Medicine. The whole group occupies a space of some 73 pages and includes a description of the transmitting agents which again are treated at length in Chapter I, which is solely devoted to arthropods. We may note the excellent photographic illustrations of rashes so distinctive of this group; there are good pictures too of verruga peruviana and Oroya fever, a subject which the editor has made particularly his own. In treatment claims made by KIRUTH for his arsenic-antimony compound S.D.T. 356 B are not substantiated.

Section IV deals with nutritional disorders and in the opening chapter on nutritional oedema there appears to be some confusion with epidemic dropsy which is however later given full status as mustard oil poisoning on p. 1210. Sprue is frankly classified as a nutritional disease and this chapter may be regarded as the most disappointing in the whole work—occupying only 14 pages without illustrations; this surely suggests some lack of balance when one compares it with S. American trypanosomiasis in Vol. I—a comparatively unimportant subject from the clinical aspect—which is profusely illustrated and occupies a full 20 pages. Hill diarrhoea is frankly admitted as an incipient stage of sprue.

Beriberi and pellagra, to which 17 pages apiece are devoted, are given full consideration but a curious omission is the absence of all mention of secondary avitaminosis which has assumed such an important rôle in general medicine.

Immunity from reinfection with coccidia is absolute and does not require the persistence in latent form of an infection with the parasite. Other instances given of complete acquired immunity are the resistance exhibited by rats which have recovered from *T. lewisi* and of mice which have recovered from *T. duboni* infections.

Texas fever was the first parasitic disease in which resistance to subsequent infection was shown to depend on the continued presence of the parasite in latent form in the blood and the fixed tissues of the host (premunition). The word premunition occurs very frequently in this treatise on parasitic infections.

The author writes: The term premunition was proposed by Sargent in 1924 to describe a form of resistance which depends on the mutual tolerance of the host and parasite. Again: Cattle acquire a tolerance of the parasite if treated early with suitable drugs, and thereafter survive for long periods in endemic areas in spite of reinfection.

It is difficult to see what advantage is obtained by using the word premunition in place of the older expression tolerance. The term premunition as shown above is constantly defined in terms of tolerance, and the more it is so defined the more it appears to be identical with tolerance.

Instances of premunition given are the resistance possessed by man infected with amoebiasis, that by cattle with *Trypanosoma brucei* or *T. congolense* and that by negroes in the tropics with malaria infections.

Certain intestinal helminthiases appear at first sight to offer examples of premunition, in so far as it is not easy to add to the existing infection. But that this state may not necessarily be due to premunition, with production of antibody is suggested by the fact that an animal which has been cured by an anthelmintic can be reinfected immediately. The freedom from added infection in such cases may be attributed to causes other than resistance following antibody production. It may be put down to lack of sufficient space and food to support more parasites. A similar cause it is suggested, may account for the facts that a second infection with *Ascaris* or hookworm is seldom superimposed on one already existing and that reinfection usually occurs promptly when the adult stages are removed by anthelmintics.

Some larval cestodes which invade somatic tissues present a difficulty since they are not dislodged while the host lives. The resistance to further infection shown by the infected animals could be attributed to premunition. There is, however, experimental evidence, commencing with the well-known work of Miller which proves that immunity can develop as the result of such infections. Rats which had become infected with the cysticerci of *Taenia crassicoilis* and from which all the cysticerci had later been surgically removed were shown to remain immune to reinfection for a period of at least two months.

Parasite antigen can often be detected in the early stages of acute parasitic infections, antibody in the later stages (second and third weeks) of acute infections, and also in chronic ones. The amount of absorption of antigen from parasites in the alimentary canal usually depends on the degree of invasion of the mucosa by the parasites. In the case of adult tapeworms such as *Taenia saginata* attached superficially, the absorption is so low that tests applied to the blood serum of the host for the presence of antigen and antibody give poor results. The author emphasizes the fact that parasites contain many antigens.

and that some of these occur in parasites other than that with which the host is infected. The reaction between antigen and antibody which results when antigen from such extraneous parasites reacts with the serum of the animal being examined—a group reaction—is not properly described as non-specific. It is specific the antibody present combines only with its own specific antigen though the latter may occur in species or even genera of parasites other than the one which is infecting the animal.

The test for antigen has been employed in malaria, trypanosomiasis and leishmaniasis. Trichiniasis in rabbits and *Haemonchus* infection of sheep can also be diagnosed by the presence of antigen in the serum of the infected animal early in the infection. The tests for the presence of antibody have had wider application: they are directed towards the discovery of (1) Agglutinin—in malaria, leishmaniasis and trypanosomiasis. For this test in helminthiasis the use of suspensions of finely divided particles of helminth bodies is suggested. (2) Precipitin—this can be detected in some protozoal diseases and in numerous helminth infections. (3) Complement fixing antibody—complement fixation is the most delicate test for antibody in protozoal and helminth infections. (4) Adhesin—the test for adhesin is so far of less practical utility than the others. (5) Skin tests—these are the simplest to perform of all the diagnostic tests for helminthiasis: they become positive by the second or third week after infection. The antigens may be almost universally present in a group of parasites: e.g. practically any species of cestode will yield antigen for the skin test in *Echinococcus* infection: an extract of any schistosome will serve for the skin test in human schistosomiasis: an extract of *Dirofilaria immitis* or *Contortospiculum theae* reveals infection with any of the human filariae. The reactions, however, are most intense with antigens from the homologous parasite. Either adult or larval stages can be the source of the skin-testing antigen: the antigenic constitution of adult and larva being the same.

The volume is excellently printed on good paper: notable considerations at the present time. Each reference to an author is given below the text on the same page. The convenience of this arrangement more than compensates for the repetition of some references in other sections.

This book will be of great practical value not only to all research workers in the field of parasitology but also to those who are concerned with the diagnosis, treatment and prevention of parasitic diseases.

D. B. Blacklock

BROOM (J. C.) [M.D. Bacteriologist to the Wellcome Bureau of Scientific Research, London] *Aids to Tropical Medicine*. 4th Edition, Revised.—pp. viii+203. With 30 figs. & frontispiece of 7 figs. 1942. London: Baillière Tindall & Cox, 7 & 8 Henrietta Street, Covent Garden, W.C.2. [5s.]

The greater part of this book has been re-written as a consequence of the advances made in the knowledge of tropical medicine since the last edition was published in 1927. The re-writing is evidently the work of an expert and the amount of accurate information given in so small a space is astonishing. The diseases are grouped according to their causes—viruses, bacteria, protozoa, etc.—and there is a short section on medical entomology and a final chapter on the technique of blood and faeces examination.

In a book of this length it is obvious that there is no room for discussion, and that statements must be dogmatic. Criticism on the level of that which would be adopted in the case of a full text-book is therefore unjustified. For its purpose, that of a student's notebook, the book does very well but although much has been included, much has inevitably been left out. In the section on medical entomology which occupies 20 pages, there is a key to many of the genera of the Pulicidae giving greater detail than the book would seem to require. Although *Stomoxys* is described at some length, there is no account of the bromosomes of *Glossina morsitans*. In this section the information, therefore is somewhat unbalanced. It might be an improvement to eliminate this section altogether and to utilize the space for amplification of purely medical information. Some of the illustrations are excellent others give little information.

C W

TROPICAL DISEASES BULLETIN

Vol. 39]

1942

[No 6

SUMMARY OF RECENT ABSTRACTS *

V LEISHMANIASIS

VISCERAL

Epidemiology

STEPHENSON (p 250) reports on an epidemic of kala azar in the Sudan which began in 1932 and lasted for about eight years. In three years at least 300 cases occurred in a population of 8 000 and the fatality rate was 80 per cent. Few recovered even among those admitted to hospital and given the standard treatment. It is thought that the epidemic arose from contact between the Dinkas of the area concerned and the Maabans in whom an outbreak was reported in 1923.

HOEPPLI (p 252) notes that although sporadic cases of kala azar have been reported from West Central and South China the real home of the disease is north of the Yangtse valley. Canine kala azar is common in Peiping and if it can be established that the canine disease of North China is identical with human kala azar the dog will have to be regarded as a reservoir of the human disease as it is in the Mediterranean area. CHUNG (p 252) takes up this point and argues that recent study has brought increasing evidence of the identity of the human and canine disease in this area. This evidence is convincing.—In Peiping there is a very close association between cases in dogs and in man. In a small village the identification and treatment of all human cases was not followed by disappearance of the disease and it was later found that the dogs were infected and appeared to act as reservoir. hamsters cured of one infection show some immunity to the other and the same appeared to be true in one human case. complement fixation tests cannot differentiate the two. the parasites are morphologically identical and are equally pathogenic to experimental animals producing identical reactions. *Phlebotomus chinensis* is as readily infected by the one strain as by the other. CHUNG and LI (p 570) report further developments of the investigations.

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

in villages near Peiping. Close association between canine and human kala azar was found and there is strong presumptive evidence that the dog is the reservoir of human disease.

GALLIARD (p. 570) however though not disputing the general conclusions arrived at by Chung points out that in the legations quarter of Peiping, although canine kala azar is common, the human disease is rare.

CLOW (p. 569) states that kala azar is widespread in the Shensi province of Northern China.

MITRA (p. 251) reports that the situation in North Bihar as regards kala azar is acute, and that in this area 83,981 cases were treated in 1937.

MAZZA (p. 251) refers to a few cases of kala azar which have been found in the Argentine.

MELLO (p. 571) reports the finding of leishmania in smears from ulcers on a cat in Brazil, but could not determine whether they were *L. brasiliensis* or *L. chagasi*.

Actiology

YOTAG (p. 253) reports that after a Chinese strain of *L. donovani* had been injected into a Chinese hamster the animal acquired a generalized infection, and that at a later stage there developed a tumour of the foreleg, adherent to the periosteum. This consisted of macrophages and fibroblasts with leishmania and was of the same nature as the tumours which have been noted in infections of animals with *L. infantum*. It has been thought that tumour formation of this kind was characteristic of *L. infantum* infection enabling it to be distinguished from Chinese strains. The present finding throws doubt on the validity of this distinction.

CHU and ZIA (p. 572) state that Chinese hamsters can easily be infected with *L. donovani* by intratesticular inoculation, and that the parasites can sometimes be found by intratesticular puncture as early as the fifth day. HU and ISHII *et al.* (p. 254) report that with the Japanese striped squirrel *Eutamias asiaticus* the infection rate after inoculation of *L. donovani* is as much as 100 per cent.

ISHII (p. 254) reports on experiments in which *L. donovani* and *L. tropica* infections were induced in animals by administration or injection by different routes. Emulsions of infected liver were usually successful in inducing infection. Flagellates from culture were usually unsuccessful.

ADLER (p. 255) has produced infection in two of six patients suffering from inoperable cancer: one with injection of cultural forms of the leishmania of kala azar, the other with emulsion of infected hamster spleen. He discusses the possible effect of human serum, which normally has a lytic effect on the parasites, in preventing infection attempted in this manner.

ISHII *et al.* (p. 258) show that *L. donovani* is capable of passing through the placenta, to cause infection in the young of infected mice.

PAI and HU (p. 571) report that *L. donovani* will not multiply within the cells of chicken, hamster or human tissue cultures.

The question of the identity of *L. cavia* and *L. donovani* in North China, and its epidemiological implications are discussed above (Epidemiology).

Transmission

SMITH HALDER and AHMED (p 256) have gone far to prove the transmission of kala azar by sandflies. In their first paper they describe a method for the maintenance of *Phlebotomus argentipes* on nutriment other than blood demonstrating incidentally that blood feeds are not necessary for the satisfactory development of leishmania after first infection. In the second paper the authors show that the sandflies may become blocked as fleas become blocked with plague bacilli. Blocked sandflies cannot ingest blood and it is assumed that in their efforts to do so they discharge dislodged flagellates into the skin. Blocked flies are found only among those attempting to feed a second time on blood. In the third paper the authors describe transmission experiments. *P. argentipes* were fed upon a patient with kala azar and were then maintained for 10 days on a diet of raisins. At the end of that time they were offered a blood meal on experimental animals. Of 5 hamsters and 8 mice used, all except 6 mice became infected. It was shown that complete blockage of the flies was not essential for transmission but that one animal bitten by blocked flies only acquired a very heavy infection. There is no evidence that the virulence of the leishmania increased during development in the flies but since it is known that human serum has a lytic action on leishmania, it may be that flies which take blood during the period of leishmanial development produce less intense infections than those maintained on fruit juices. These results which are much better than those achieved in earlier experiments are what would be expected of *P. argentipes* since it was found to be so closely connected epidemiologically with the spread of kala azar.

HOEPLI (p 252) shows that the Chinese strain of *L. donovani* develops in *Phlebotomus chinensis* which readily becomes infected when fed on infected hamsters and dogs but less readily when fed on man in whom there are fewer leishmania in the skin. CHUNG (p 252) points out that in N China *P. chinensis* is readily infected with *L. donovani* and that migration of flagellates forwards to the pharynx and proboscis is common. *P. sergenti* var *mongolensis* on the other hand, is not so easily infected, and the infection seems to persist only if blood is present in the stomach.

PARAENSE and CHAGAS (p 572) state that in South America, *P. longipalpis* and *P. intermedius* when fed on dogs with kala azar become infected with leptomonads. That these are actually derived from the dogs is indicated by the fact that generalized leishmaniasis has been induced in hamsters by the injection of ground-up infected flies.

HOEPLI (p 252) considers that the fact that leishmania may be found in nasal secretions urine or faeces does not throw any light on the epidemiology of kala azar. [It will be remembered that in the Sudan leishmania have been found in nasal secretions and certain animal experiments indicated that contact infection without the intervention of any vector was possible. See this Bulletin 1937 Vol 34 pp 40 567]

Pathology

GATTO (p 259) gives reasons for the view that the anaemia of kala azar is due not to an increase in the haemolytic process but to defects in blood production which result from changes in the bone marrow.

HU (p 256) recalls that in kala azar certain intercurrent infections such as pneumonia and cancerum oris may be followed by complete

disappearance of leishmania from the body. With this in mind, he gave repeated injections of bacteria, horse serum or beef broth to infected hamsters but though there was some evidence of increased resistance in no instance was the infection prevented. Two types of enlarged spleen were found—one very large, with scattered nodules of reticulo-endothelial cells containing few leishmania—the other less enlarged with fewer reticulo-endothelial cells, not collected into nodules but laden with leishmania.

AJELLO (p. 570) points out that, in dogs, leishmanial ulcers are indistinguishable macroscopically from traumatic or trophic ulcers that they are often the only sign of the disease observed, and that they usually occur on areas of skin exposed to trauma. In all the cases observed, visceral lesions were found and it is concluded that the parasites with their predilection for reticulo-endothelial tissue invade the skin and internal organs with equal readiness.

LIEU (p. 255) states that after intracerebral inoculation of infected spleen suspensions into hamsters phagocytosis of the leishmania by the amoeboid macrophage cells at the site of injection took place.

Diagnosis and Clinical Findings

LAMA (p. 289) points out that the aldehyde test rarely becomes positive until the disease has existed for at least four months, and that certain other diseases may give results which cause confusion. He quotes a case in which the test was positive but in which malaria alone was found.

GIRAUD and GAUBERT (p. 258) discussing diagnosis point out that serological tests are not absolutely reliable and that the presence of parasites should always be demonstrated. Spleen puncture gives the best results but is said to cause fatal haemorrhage in 1 per cent. of cases. Examination of sternal marrow or tibial marrow in children is safe and effective—in children gland puncture is very good, but in adults is not always possible. BENHAMON (p. 258) agrees that sternal puncture is the method of choice but points out that monocytosis of lymph gland juice is almost diagnostic even in the absence of leishmania. He also states that skin scrapings are often useful in diagnosis. In China CLOW (p. 566) advocates sternal puncture in preference to spleen or liver puncture. ANDREU *et al* (p. 573) in Spain prefer sternal puncture to other diagnostic methods.

For diagnosis in dogs, Ho *et al* (p. 571) recommend and describe a method of drum puncture.

DAVIES and WINGFIELD (p. 572) advocate gland puncture in diagnosis and describe the technique.

ISHII *et al* (p. 258) show that inoculation of infected material into the anterior chamber of the eye of a rabbit produces heavy infection two to four weeks later. They suggest that this response may be employed for diagnostic purposes.

LEWIS and MACDONALD (p. 281) record a case in the Sudan in which visceral, cutaneous and mucosal leishmaniasis were present. Lesions in the nose suggested espondia cases of which have been reported before in the Sudan.

STEPHENSON (p. 250) notes that in the recent epidemic in the Sudan the disease was of acute type with high mortality even when standard treatment with neostibosan and tartar emetic and, in some cases, antihomaline was given. Complications are common in the Sudan.

type of kala azar and KIRK and SATI (p 260) mention intractable diarrhoea, haemorrhages cancrum oris and lobar pneumonia. Concomitant infections are helminthiasis malaria, amoebic and bacillary dysentery CLOW (p 569) notes that in China cancrum oris occurred in 14 of 100 patients either before or during treatment two-thirds of the patients with this complication died.

Treatment

ADAMS and YORKE (p 260) report apparent cure of an Indian within 6 weeks of treatment with 4,4-diamidino stilbene Splenic enlargement was quickly reduced and shortly before discharge from hospital no parasites could be found on examination of spleen or sternal smear material. NAPIER and SEN (p 574) in Calcutta give diamidino stilbene in doses to a maximum (for individual injections) of 0.001 gm per pound of body weight Relief for ill-effects is afforded by the use of adrenalin The drug is an effective therapeutic agent in kala azar

KIRK and SATI (p 260) report on the treatment of 28 cases in the Sudan with diamidino stilbene The total dosage necessary varies greatly and the best scheme of treatment has still to be worked out but the authors favour daily injections and used from 1.0 to 2.6 mgm of the drug per kilo of body weight With this dosage toxic symptoms were negligible but in the early stages exacerbations of the disease and skin lesions were not uncommon The results were very good but some of the patients had not been long observed.

These authors (p 573) give a later report on the same patients in whom the results were highly satisfactory after a further period of observation especially in view of the fact that most of them had one or more complications including cancrum oris. In comparison with the results obtained in the Sudan with antimony those achieved with 4,4-diamidino stilbene and with 4,4-diphenoxy pentane are undoubtedly good. Toxic symptoms were observed, especially with the latter but were not enough to necessitate abandonment of the treatment

KIRK and MACDONALD (p 261) report success with 4,4-diamidino diphenoxy pentane in the treatment of a patient in whom recurrence had taken place after a course of neostibosan Ten doses of 80 mgm and 13 doses of 100 mgm in 10 cc of water were given intravenously on alternate days a total of 2.1 gm There were no toxic reactions and the patient was apparently cured.

KIRK and SATI (p 261) report from the Sudan cases in which a finely punctate rash appeared usually after a first or second course of treatment with antimony or diamidino stilbene It appears only in those reacting favourably and is therefore of some prognostic importance A description of the rash is given and it is stated that leishmania may be found in scrapings from the papules but the eruption unlike the post kala azar dermal leishmaniasis of India, tends to disappear spontaneously It is thought that this phenomenon may be similar to the Herxheimer reaction in syphilis.

In the Sudan STEPHENSON (p 250) found that patients with cancrum oris as a complication of kala azar stood a better chance of recovery if treated with ureastibamine than with neostibosan and tartar emetic

DAVIES and WINGFIELD (p 572) report a case of kala azar in which after the administration of 2.6 gm. neostibosan the complication of agranulocytosis occurred. Adrenalin produced an increase in the white

cells and was given frequently for some days. Complete recovery took place, and it appeared that the attack of agranulocytosis had had a curative effect on the kala azar.

WANG (p. 262) has traced the progress of leishmanial infection in the spleens of hamsters treated with neostilbosan. Animals were killed at different stages of the treatment. Three stages were observed — In the first there was proliferation of plasma cells and lymphocytes in the second degeneration of the host cells and disappearance of parasites in the third a process of repair. The important and characteristic changes were observed in the first three weeks. WANG and CHUNG (p. 575) report on the curative action of neostilbosan on kala azar in hamsters, and note that after cure these animals show evidence of immunity against attempts to reinoculate the disease.

MITRA (p. 251) states that in Bihar thorough treatment brings about cure in 85 per cent of cases, and that the basis for a campaign of control is the establishment of intensive treatment in the affected areas.

CUTANEOUS (ORIENTAL SORE)

HALAWANI (p. 263) gives a list of endemic areas of oriental sore in Egypt. SALLAM (p. 575) refers to the fact that leishmanial skin affections are very common in the Minia province of Egypt where the patients are mainly village farmers aged about 20. The ulcers are usually multiple on the face, arms and legs. He describes the clinical appearances and the course of the infection and states that most of the sores respond to intravenous tartar emetic or to local application of 1 per cent. tartar emetic in vaseline.

MARCHLOXINI (p. 263) has seen, at the hospital skin clinic in Ankara, a considerable number of cases of oriental sore from Central and Eastern Anatolia. He discusses the atypical appearances produced by secondary infection, and states that sores may resemble syphilis, tuberculous erysipelas or pyogenic skin infections.

AKAN (p. 263) notes that certain observers have successfully treated oriental sore with atabrin.

SERIKJI and BEATTIE (p. 576) have inoculated 227 persons in Baghdad with suspensions of cultural forms of *L. tropica* in an attempt to produce immunity. Of 200 of these a sore was produced in 198 and when complete healing had taken place, attempts at reinoculation were unsuccessful, though reinfection could be produced by injection of the parasites before healing of the primary ulcer was complete. Equally good results were obtained with both young and old cultures. TEMPLETON (p. 576) describes the course of an ulcer provoked by inoculation of cultural forms of *L. tropica*.

MUCO-CUTANEOUS (AMERICAN)

PRESTANA, VILLELA and their co-workers (p. 264) give an account of the epidemiology of muco-cutaneous and cutaneous leishmaniasis in the State of São Paulo, Brazil. Intimate contact with wooded country is not always necessary but except for one town in which it is fairly common, the disease is rural in distribution, even in the zone of high endemicity. In the environs of the town mentioned, the species of *Phlebotomus* responsible for transmission are dense. OLSKI (p. 576) shows that muco-cutaneous leishmaniasis is a problem of increasing importance in Minas, Brazil, especially in the north-east. There are some purely cutaneous forms, but most are muco-cutaneous.

GEDMAN (p 264) has studied the infectivity for mice dogs and monkeys of *L. brasiliensis* from cutaneous lesions in Peru In the chorio-allantoic fluid of the chick embryo *L. brasiliensis* showed much poorer infectivity than *L. tropica*

MAZZA and CORNEJO (p 577) report very good results from the treatment of American cutaneous leishmaniasis by means of infiltration of the sore with 5 cc. of a 10 per cent. solution of atabrin combined with atabrin *per os* Complete healing of one sore took place in 15 days but the authors report failure in the treatment of mucosal lesions by this method. For them combined fousadin and yatren medication remains the best

Charles Wilcocks

FEVERS OF THE TYPHUS GROUP AND OTHER FEVERS

LANCET 1942 Jan. 31 p 149—*Rickettsial Infections in Man.*

The following table reproduced from the current notes of the Army Pathology Laboratory Service will be useful to readers of this Bulletin —

Disease	Rickettsia	Geographical distribution	Insect Vectors	Possible vertebrate reservoirs.
exanthematic typhus	<i>Rickettsia prowazekii</i>	Europe, Abyssinia, North Africa, Belgium Congo Asia Minor Persia, North China, Mexico	Loose <i>Psyllidus humanus</i>	Man
endemic or murine typhus	<i>R. prowazekii</i> var <i>moskovi</i> (= <i>R. marse</i> cold)	Worldwide	Rat flea <i>Xenopsylla cheopis</i>	Rat (squirrel shrew)
katsugamushi disease	<i>R. orientalis</i> (= <i>R. tsutsugamushi</i>)	Japan, Formosa, Malaya, Java, Sumatra, New Guinea	Larva of <i>Trombicula akamushi</i> (Japan) <i>T. deliusensis</i> (Malaya) <i>T. deliusensis</i> (India) <i>T. minor</i> (New Guinea)	Bandicoot
rench fever	<i>R. quintana</i> (= <i>R. mollicans</i> and probably <i>R. wrighti</i>)	North Africa	Loose <i>P. humanus</i>	Man
locky Mountain Spotted Fever (Eastern & Western forms)	<i>Dermacentor</i> <i>rickettsii</i>	U.S.A.	<i>Dermacentor andersoni</i> , <i>D. variabilis</i>	Goats, hares, and other small rodents
typhus boumense	<i>D. rickettsii</i> var <i>canari</i>	Mediterranean zone	Dog tick <i>Rhipicephalus sanguineus</i>	Dog
South African tick typhus	<i>D. rickettsii</i> var <i>gilliperi</i>	South Africa	Tick <i>Harmaphysalis leachi</i>	Dog?
São Paulo rural typhus	<i>D. rickettsii</i> var <i>brasiliensis</i>	Southern Brazil	Tick <i>Amblyomma cajennense</i>	Opussum
Q fever	<i>Rickettsia burnetii</i> (= <i>R. dysenteriae</i>)	Australia, U.S.A.	Ticks <i>Harmaphysalis bancrofti</i> <i>Dermacentor andersoni</i> <i>D. occidentalis</i> <i>Amblyomma americanum</i> <i>Rhipicephalus sanguineus</i> ?	Bandicoot

* Tick-borne typhus also occurs in Abyssinia and in Kenya where the dog tick *Rhipicephalus sanguineus* acts as vector

CALDER (Royall M) *Brucella, Pasteurella tularensis* and *Proteus* Agglutinins in Chronic Brucellosis.—*Jl Bacteriology* 1941 May Vol. 41 No. 5 pp 593-604

The existence of cross agglutination between tularaemia and brucellosis is now widely recognized, but there have been very few records of cross reactions between *Brucella* and *Proteus* organisms.

In a large series of patients presumably suffering from chronic brucellosis, the author found positive Weil-Felix reactions (1-80 or over) in 13.5 per cent. of the cases.

The titre of *Proteus* O\19 agglutinins was higher than the *Brucella* agglutinins in 65.9 per cent. of the cases.

The explanation suggested is that there is an antigenic relationship between *Brucella* and *Proteus*.

Mistakes in diagnosis are likely to occur unless attention is paid to the fact that ascending titres against *Proteus* are found in typhus but not in brucellosis

John W D Meyer

NAUCK (E. G) & WEYER (F) Erfahrungen bei der Zucht von Kleiderläusen und der künstlichen Infektion von Läusen mit Fleckfieber [Methods of Louse Breeding and the Artificial Infection of Lice with the Virus of Typhus Fever]—*Zent. f. Bakt. I. Abt. Orig.* 1941 Aug 28. Vol. 147 No. 6. pp 353-384 With 4 figs. on 1 plate

Detailed information is given of the technique of feeding lice at various stages of their development. gauze of varying degrees of fineness is interposed between the insects and their human host the proper intervals between feeds and the duration of each feed are specified

Among the other points stressed are the care that must be taken to breed the lice from stocks known to be free from other Rickettsiae such as *R. pediculi* and *R. quinque-dentata*. The human hosts must also be carefully selected to ensure their freedom from infection with *R. quinque-dentata*. The larvae are disinfected in 3 per cent. formal and their cages are sterilized once a week. The arm of the host is cleansed with alcohol before the lice are applied. The insects are kept in a moist atmosphere at a temperature of 32°C. The regular removal of dried faeces and dead lice is important. The faeces of the lice are examined at regular intervals to ensure the absence of contaminating Rickettsiae. the faecal particles are rubbed up with a little distilled water. smears are made and stained with Giemsa's reagent

Full details are also given of the methods of infecting the lice and of examining them afterwards for the presence of Rickettsiae. Workers engaged on the investigation of Rickettsiae will find much useful information in this paper

J W D M

NAUCK (E. G) & ZUMPT (F) Versuche zur Uebertragung des epidemischen Fleckfiebers durch die Wanzen *Cimex lectularius* L. und *Triatoma rubrofasciata* De Geer [The Question of the Transmission of Epidemic Typhus by the Bugs, *Cimex lectularius* and *Triatoma rubrofasciata*]—*Zent. f. Bakt. I Abt Orig* 1941 Aug 28. Vol. 147 No. 6 pp 376-381

The authors have already concluded that *Cimex lectularius* is of no importance in the transmission of murine typhus (this *Bulletin*

1941 Vol 38 p 443] They now report that *Rickettsia prowazeki* injected into the coelomic cavity of bed bugs remained virulent up to 28 days though the organisms did not multiply. On the other hand emulsions of bed bugs which had fed on infected guinea-pigs did not infect other guinea-pigs when injected intraperitoneally. The disease was not transmitted to guinea-pigs by the bites of one and two bed bugs which had previously fed on infected guinea-pigs.

Similar tests were made with *Triatoma rubrofasciata* with negative or doubtful results. Both kinds of bugs were fed on infected patients but did not become infected. These results were not regarded as conclusive because the stage of infection of the patients was not considered favourable for the transmission of the virus.

Neither of the insects was thought to be suitable for the transmission of infection by *R. prowazeki* or for the preparation of a vaccine.

J W D M

WETZEL (Ulrich) Fleckfieber und Nierenschädigung [Kidney Lesions in Typhus Fever]—*Med Klin* 1940 Nov 22 Vol. 36 No 47 pp 1312-1313

A fatal case of typhus fever is described in which there was acute glomerulo-nephritis. The author states that the medical text books do not lay sufficient emphasis on the damage to the kidneys in typhus fever. Most of the writers suggest that this is an unimportant and infrequent feature of the disease.

HERTZOG *et al* (1935) are quoted as stating that in their experience of typhus fever epidemics in Chilli 67.5 per cent. of the fatal cases had acute glomerulo-nephritis 22.5 per cent. had interstitial nephritis and only 10 per cent. had no kidney lesions.

J W D M

NAUCK (E G) Malaria und Fleckfieber. Vergleichende pathologisch-anatomische Betrachtung [Malaria and Typhus Fever. A Comparative Study of their Morbid Anatomy]—*Dtsch Med Woch* 1941 Nov 14 Vol. 67 No 46 pp 1259-1262

The author points out that in both malaria and typhus fever the infection is introduced into the body by an insect and the chief lesions are localized in the vascular system.

The paper consists chiefly of a detailed comparison between the post-mortem changes found in the two diseases. The points of resemblance are emphasized but the differences described are so numerous that difficulty in diagnosis must be quite exceptional even when little information is available about the clinical features of the cases. The paper is of interest chiefly to pathologists.

J W D M

FINDLAY (G M) Laboratory Investigations on Typhus.—*Proc Roy Soc. Med* 1941 Dec. Vol. 35 No 2, pp 157-160 (Sect. of Epidem. & State Med. pp 17-20) [31 refs.] [Summary appears also in *Bulletin of Hygiene*]

This paper gives a clear and concise account of the laboratory methods employed in connexion with louse-borne typhus fever.

(1) *Diagnosis*—Proof that a disease is typhus can only be obtained by the isolation and passage of the *Rickettsiae* through animals.

Two to five cc. of the patient's blood are allowed to clot in the refrigerator—the clot is ground up in normal saline and injected intraperitoneally into a guinea-pig. In positive cases a febrile attack ($40^{\circ}\text{C}.$) follows within 7 to 12 days. The virus is passed through a succession of guinea-pigs by intraperitoneal injections of 1.0 cc. of equal parts of 10 per cent. suspensions of the infected guinea-pig's spleen and brain. The animals show no naked eye changes but sections of the brain have small collections of round cells. In murine typhus the guinea-pigs get orchitis as well as fever and the virus can be transferred through rats which react very slightly or not at all to exanthematic typhus. In Mexico and China strains of *Rickettsia* have shown features intermediate between those of murine and exanthematic typhus.

The commonly used test for typhus is the agglutination of *Proteus* OX19—this should be positive within seven days though delays in the response have been recorded, even up to 19 days. Titres up to 1-5,000 are frequent, they may even be as high as 1-100,000. With *Proteus* OXK the reaction is negative or slight. In murine typhus the same reaction occurs but usually to lower titres such as 1-200 to 1-2,000.

Positive Weil-Felix reactions also occur in undulant fever in titres of 1-80 to 1-240 but the progressive rise in titre does not occur [see CALDER above]. In typhus there may be a rising-titre agglutination against typhoid organisms—in these anamnestic reactions the increase is almost entirely in the H agglutinins.

Agglutination of typhus *Rickettsiae* also occurs, but this test needs further investigation.

Typhus *Rickettsiae* injected intradermally into rabbits cause the formation of a nodule—if the *Rickettsiae* are mixed with serum from a recovered patient the nodules are not formed. The strength of the rickettsiæidal bodies in a serum can be determined by using varying dilutions of the serum.

(2) *Specific Treatment*.—No effective chemotherapeutic treatment is known. Convalescent serum has not been very useful, but the serum of horses which have been hyperimmunized with *Rickettsiae* from infected mouse lungs is being tried—there is a small stock of this serum in London [See DURAND and BALOZET below].

(3) *Prophylactic immunization*.—Live murine *Rickettsiae* attenuated by passage through the brains of mice and treatment with egg yolk, or by treatment with bile, and *Rickettsiae* from the faeces of infected fleas have been used on a large scale, but there are no accurate figures to show their value and they are not free from risk in view of the possibility that murine *Rickettsiae* may be converted into exanthematic *Rickettsiae* by passage through lice infected by biting a patient.

Weigl's vaccine prepared from the phenolized intestinal contents of lice infected *per rectum* with *R. prowazeki* appears to be of considerable value but this method involves a delicate technique and also the employment of a large staff of immune persons on whom the lice are fed.

Killed *Rickettsiae* obtained from the lungs of mice infected intratracheally or from cultures made in the yolk sacs of developing chicks are under trial, but the results so far are described as "poor".

Further research is needed to find a satisfactory method of immunizing against exanthematic typhus.

[Other workers, including FELIX, are by no means so pessimistic as Findlay about the prospects of success with killed rickettsial vaccines.]

J. W. D. M.

serum-treated patients. Sulphonamides were not given because the authors had previous experience of disasters resulting from the use of sulphapyridine in the treatment of typhus fever.

Serum sickness to the degree of causing a rise of temperature above 38°C. was seen in less than 10 per cent—it was of little consequence because it always appeared when the patients had already begun to gain strength.

There was little interference with the normal evolution of the Weil-Felix reaction although in eight cases the maximum titre did not rise above 1-400 to 1-600.

The 8 European patients did not respond so well to the treatment as the indigenous patients: one died of uraemia on the 11th day; the duration of the fever in the others was 12 to 16 days except in one patient aged 15 whose fever lasted only 9 days. J W D M

MACKENZIE (M D) Some Practical Considerations in the Control of Louse-borne Typhus Fever in Great Britain in the Light of Experience in Russia, Poland, Rumania and China.—*Proc. Roy. Soc. Med.* 1941 Dec. Vol. 35 No. 2 pp. 141-156 (Sect. of Epidem. & State Med. pp. 1-16) With 1 folding map & 4 charts. [Summary appears also in *Bulletin of Hygiene*]

This paper based on extensive personal experience is of special importance at the present time.

The louse-borne form of typhus, so far as is known, is the only kind of typhus that is primarily a disease of man and that occurs as epidemics. The tick-borne, flea-borne and mite-borne types are endemic and localized, being accidental infections in man. Flea-borne typhus coexists with the louse-borne form in Mexico and Manchuria and there is evidence that the flea-borne virus if transmitted through lice can produce a disease indistinguishable from classical typhus, and so may originate epidemics of louse-borne typhus [see this *Bulletin* 1940 Vol. 37 pp. 256-267].

In Russia during the years 1919 to 1922 it was estimated that there were ten million cases of typhus with three million deaths. Great movements of population play a great part in spreading the disease: non-immune persons are brought into infected areas or infected persons are brought into unaffected localities. Famine may be a more important predisposing factor than overcrowding. In endemic areas the curve of incidence starts in November or early December reaching its maximum in March or April, and ends in June or July. In epidemic form the disease may occur at any time of the year: for example in Spain in 1941 the epidemic started in April and reached its maximum in June and July. The disease is more fatal in non-endemic than in endemic localities: it is mild in children and becomes progressively more severe till the age of fifty after which it is practically always fatal in epidemics.

MURCHINSON'S classical description written in 1873 cannot be improved on but in epidemics the picture is often confused by the coexistence of other diseases such as relapsing fever, malaria, typhoid, measles, scarlatina, etc. Two helpful points in differential diagnosis are the rarity of the rash on the face and the fact that the rash does not come in crops. The distribution and time of appearance of the rash are very variable: in mild cases and in children there may be no

rash. In sporadic cases diagnosis is seldom possible till the rash appears usually about the fourth or fifth day. A rising titre agglutination to *Proteus OX19* is the best method of diagnosis, a strong naked-eye agglutination in titres of 1-80 to 1-100 is regarded as diagnostic but often it does not help during the first week. Retrospective diagnosis is sometimes important when the actual attack has not been seen. Useful clues are persistent slowing of the mental process transient delusions localized paralysis tremors of the hands cardiac exhaustion and localized gangrene. Second attacks are rare and are mild when they do occur.

Administrative Control of Epidemics

The personnel are notoriously exposed to grave risks they must be young and must be provided with protective clothing good arrangements for disinfection and proper nourishment. Protective inoculation is seldom practicable in existing conditions.

An effective sanitary cordon must be established round healthy areas and every one who enters the protected zone must be disinfested. At one centre in Russia in 1921 refugees returning from Poland were deloused at the rate of 10 000 daily. The methods employed depend on local conditions cyanide gas hot air steam the Serbian barrel and hot ironing of clothes are mentioned. Provision of food for the affected population is often essential. In one area in Russia five million people were fed daily and extensive tractor cultivation was started so that the community was well nourished before the arrival of the next epidemic season.

For the control of typhus in Great Britain the following points are emphasized every detail of the work of the preventive staff must be closely supervised by the medical officer in charge the clothing recommended in Memo 252 MED of the Ministry of Health should be worn it must be changed after two or three hours of wear masks and goggles are desirable to prevent the possibility of infection by the dried faeces of infected lice rubber gloves and gum boots should be worn.

General delousing of the population at risk is even more important than the search for remote contacts who are often impossible to detect because they may have been infected up to a fortnight or more before the diagnosis of the first case. Lice are transferred from man to man chiefly by actual contact this may even be by rubbing shoulders in a crowded thoroughfare.

For the reception of patients a specially appointed hospital unit is needed this should have a separate admission block with provision for delousing. The patient is first shaved then bathed with a medicated soap possibly soft soap mixed with paraffine which is thoroughly applied with a nail brush. A second disinfection is carried out a week later to kill lice which may hatch out from nits. For premises cyanide gas is the best means of disinfection for clothes steam or hot air can be used.

The first case is often missed in Glasgow from 1901 to 1926 there were 87 groups of cases in 96 of these the first case was wrongly diagnosed. The M.O.H. must keep a constant watch for suspicious deaths and be in close touch with the doctors. Educational propaganda is of great value [The paper is full of important information which cannot be adequately dealt with in a summary.]

J H D M

ROSE. Fleckfieberfragen bei der Umsiedlung der Volkdeutschen aus dem Ostraum 1939/1940 [The Control of Typhus Fever in the German Colonization of Poland (1939-1940)]—*Dtsch. Med. Woch.* 1941 Nov 14 Vol. 67 No. 48. pp 1262-1265

This paper deals with the vast and complex problem of typhus prevention in a mass movement of 132,000 settlers from Germany to the newly occupied "ostraum" in Poland.

The settlers had to pass through regions devastated by war swarming with impoverished refugees and notorious for the prevalence of typhus fever. Other adverse factors were the bitter cold of the season (Dec. 1939 and Jan. 1940) the lack of information about the prevalence of the disease in the localities traversed by the expedition and the recent occurrence of the disease in some of the areas from which the settlers had come.

An account is given in general terms of the elaborate measures of control which were adopted. The most striking of these was the establishment of a delousing station at the key point Litzmannstadt where all the colonists were deloused at the rate of 4,000 daily. Special observation posts were set up along the route and the migrants were kept constantly under close inspection by the sanitary authorities, the staff of which had been previously inoculated and thoroughly trained in their special duties.

Over-night camping in doubtful areas was avoided as far as possible. Places inhabited by Germans were selected, but occasionally the parties halted in the open in spite of the extreme cold. Temperatures as low as -45°C were experienced.

Altogether there were nine cases of typhus fever. The patients were promptly isolated so that infection never spread to contacts.

No details are given of the preventive measures except that hot-air disinfection is mentioned as being selected on general grounds and also because of its effectiveness in sterilizing the faeces of infected hce.

The author claims that the elaborate precautions were thoroughly justified by the results.

J. W. D. M.

STEUER (W). Ueber die Trockenblut Probeagglutination bei Infektionskrankheiten und ihre Anwendung bei der Bekämpfung des epidemischen und endemischen Fleckfiebervorkommens. [The Dry Blood Agglutination Test in Infectious Diseases and its Application in the Control of Typhus Fever Occurring in Epidemic and Endemic Form.]—*Munch. Med. Woch.* 1942, Jan. 9 Vol. 89 No. 2. pp 33-37

A method is described by which the most important agglutination tests can early and quickly be carried out by the bedside and in the field.

No new principle is involved. Tests were made on the same lines in the early days of the Widal reaction and are still in frequent use in the U.S.A. The technique as worked out by Dr. KUDICKA and the author has already proved its value in the control of typhus fever in time of war. The method is as follows. The finger or ear-lobe is cleansed with alcohol, thoroughly dried and pricked with a Francke's or other needle. There must be a free flow of blood; squeezing is not permissible. The first drop is wiped off, then three droplets of blood

are taken up with a loop of platinum wire of 0.6 mm. gauge and a circular opening of 2.0 mm. diameter the three droplets are spread in a row on a clean glass slide so that each forms a round smear of about one cm. in diameter. The droplets are very uniform in size each containing about 0.003 cc of blood or about 0.0015 cc. of serum. The preparation when thoroughly dried at room temperature can be used for the test at any time up to several days after long delay the agglutinins become weaker.

The bacterial suspensions used are (1) *Proteus* X19 killed at 75°C this keeps at room temperature for about two weeks if alcohol is added to make a strength of 20 per cent it keeps for five months (2) typhoid and dysentery suspensions are killed by adding 0.1 per cent. formaldehyde paratyphoid by adding 0.2 per cent. formaldehyde these keep well for several months and do not involve rigid precautions to prevent contamination so they can be kept in bottles and used repeatedly. Strokes made with a grease pencil between the smears prevent the suspensions from running together during the later procedure. To one of the smears 0.02 cc of the suspension is added with a small measuring pipette preferably of the Kahn type to the next smear 0.04 cc is added and to the third 0.08 cc. The suspensions are thoroughly mixed with the blood films using the corner of a glass slide. The readings are made after 1.5 and 10 minutes for typhus after 1.5 and 15 minutes for the enteric group and after 10.20 and 30 minutes for the dysentery group. Before and between the readings the slide is gently tilted up and down repeatedly. Evaporation can be prevented by placing the slide on a sheet of moist filter paper and covering it with the lid of a Petri dish.

When agglutination occurs there is a formation of fine to coarse granules or of greyish white floccules. Observations are made with a pocket lens or with low powers of the microscope. Special tables have been prepared to show how the various results compare with those obtained by the standard tests the dilutions employed the time of appearance of the reaction and the size of the clumps being taken into account. [No description is given of these tables in any case it would be desirable to carry out preliminary comparative tests using both methods simultaneously.] The suspensions are kept at room temperature in the dark if kept in the refrigerator agglutination is delayed.

For extensive surveys one drop of blood can be taken from each person, three droplets being placed on each slide. In one instance 200 specimens were taken in 90 minutes and the results determined in two hours. Cases positive to the addition of 0.02 cc of suspension were fully examined later.

Many outbreaks of typhus fever were investigated by this method in Poland. Of 879 persons examined 206 gave positive reactions. Among the negative results were those of 10 persons who had just been attacked and of 23 who had been attacked within the previous year. Among the 206 positives 100 were in patients suffering from obvious attacks of fever simulating influenza. There were 35 patients who had attacks of fever but in whom a more or less definite rash was seen there had no fever but in whom a more or less definite rash was seen there were six persons who also had a rash but gave negative reactions. Most of the ambulatory cases were in children who usually were members of a family or community in which typical cases were occurring.

In persons who had never been exposed to the risk of typhus no reactions were ever observed which corresponded to Weil-Felix titres higher than 1-200 but in typhus areas there were rare cases in which higher titre reactions occurred in persons suffering from other fevers these were probably of the anamnestic type

The degree of importance of mild attacks in the transmission of infection is a matter which needs further investigation.

The dry-drop method has great possibilities and is worth serious consideration not only for the detection of typhus fever but also for the discovery of carriers of enteric infection in the latter case Vi bacillary emulsions are of special value

J W D M

SWYDER (J C) & ANDERSON (C R) The Susceptibility of the Eastern Cotton Rat, *Sigmodon hispidus hispidus* to European Typhus.—*Science* 1942. Jan. 2 Vol. 95 No. 2453 p 23

The cotton rat *Sigmodon hispidus hispidus* is susceptible to the Rickettsiae of classical louse-borne typhus when these are introduced by the intraperitoneal intracardiac or nasal routes young rats are more susceptible than old Incubation of the Rickettsiae with serum from patients recovered from the disease prevented infection when the mixture was given by intracardiac injection in doses 5 to 50 times as great as the minimal lethal dose

A still more susceptible animal is needed, but the cotton rat is more suitable than the guinea-pig for investigation of typhus Its susceptibility to murine typhus is much less marked

C H

MACCHIAVELLO (Atilio) CIFUENTES (Osvaldo) & OVALLE (Héctor) Influencia de la avitaminosis C en la evolución del tifo europeo experimental del cobayo [The Influence of Avitaminosis C on Experimental Epidemic Typhus in Guinea-pigs].—*Rev Chilena de Hig y Med Preventiva* 1940 Sept Vol. 3 No 2 pp 111-120 With 1 chart [18 refs.]

Twelve guinea-pigs were kept for 6 to 15 days on a diet completely devoid of vitamin C and were then inoculated by the intraperitoneal route with a strain of Rickettsiae of epidemic typhus.

Six of the animals survived for 7 days after inoculation in four of these the incubation period was 4 to 5 days instead of the usual 7 to 8 days

The febrile attacks in five of the six animals ran the usual course this was followed by a subnormal temperature and death. There was no scrotal reaction. Smears from the peritoneum and tunica vaginalis contained more Rickettsiae than were found in the case of control animals kept on a normal diet and inoculated in the same way but the Rickettsiae were far fewer than in devitaminized animals inoculated with murine virus

Although the results are in keeping with the view that vitamin C deficiency lowers the resistance to typhus infection they lend no support to the theory that deficiency of the vitamin in winter-season diets causes an increase in the number of inapparent attacks and a corresponding diminution in the apparent attacks.

J W D M

FRAENKEL (E. M.) *Typhus Fever*—*Brit Med J* 1942 Feb 7
pp 199-200

This short paper contains remarks on various aspects of louse borne typhus chiefly with regard to epidemiology transmission and protective measures
C IV

BRAZZAVILLE [AFRIQUE FRANÇAISE LIBRE] RAPPORT SUR LE
FONCTIONNEMENT TECHNIQUE DE L'INSTITUT PASTEUR EN 1940
[CECCALDI (Jean), Director] pp 45-53—*Fièvres exanthématiques*
[*Fevers of the Typhus Group in Brazzaville.*]

In 1936 murine virus was isolated from rats in Brazzaville (in Equatorial French Africa) and in the following year two cases diagnosed as murine typhus were reported. In 1938 a case of boutonneuse fever was recorded.

The present report deals chiefly with an outbreak which occurred among indigenous soldiers living in a rat-infested camp during the three months November 1939 to February 1940

The agglutination responses of 20 patients are given all were positive to *Proteus OX19* in dilutions ranging from 1-300 to 1-2 400. In some cases there were also feeble responses to *OXA OX2* and *OXL*. Blood from three patients was inoculated by the intraperitoneal route into guineapigs in two cases the results were completely negative in the third there was fever and a pronounced orchitic reaction but no *Rickettsiae* could be detected in smears from the peritoneum or tunica vaginalis subinoculations of the animal's brain into two other guineapigs gave inconclusive results

Nine rats from the quarters of affected persons were examined with negative results

On the strength of the orchitic reaction in one guineapig the mild character of the disease and the serum reactions the author regarded the outbreak as one of murine typhus. No mention is made of the presence or absence of lice in the patients or of evidence with a bearing on the possibility of man to-man transmission

Three attacks of a typhus-like fever occurred in Europeans during the same period in all three the Weil Felix reaction was completely negative. Guineapig inoculation gave a negative result in one case in another there was a slight febrile reaction lasting three days with an incubation period of eight days. In two cases there was a rash

J IV D M

HEILIG (Robert) & NAIDU (V. R.) *Endemic Typhus in Mysore*—
Indian Med Gaz 1941 Dec. Vol. 76 No 12. pp 705-710
With 5 charts & 3 figs. on 1 plate. [28 refs]

Four sporadic cases of a fever of the typhus group are described one of the patients lived in Mysore city the other three became infected in separate villages within 15 miles of the city

The temperature charts show that the attacks lasted from 15 to 21 days and that the fever at its height was for the most part remittent in type it became intermittent about four or five days before its termination. A conspicuous rash was first seen from the eighth to the tenth day it was macular and maculo-papular in all the cases and was widely distributed but was most abundant on the arms and

legs including the palms and soles. It was slight on the chest and face. Brown staining persisted at the sites of the spots for weeks or even months especially on the hands and feet.

In three of the cases agglutination tests were done on two or three occasions between the 11th and 20th days against fresh Kasuli strains of *Proteus* OX19 OXA and OX2 the responses were always negative. Wassermann, Kahn and Kline reactions were sometimes positive at the height of the rash but soon became negative.

Blood from one patient was inoculated intraperitoneally into guineapigs, which responded with a febrile reaction and swelling of the scrotum. Rickettsiae were found in smears from the tunica vaginalis.

Each of the patients had been living in a house infested with rats some of which were trapped, but were not found to be infected. No lice were found and the patients denied having been bitten by ticks or mites. The authors state that "the diagnosis of endemic tropical typhus [presumably flea-borne] appears to be beyond doubt from the evidence given." Mite-borne typhus was excluded by the absence of any ticks, mites or lymphadenitis and tick-borne typhus by the absence of evidence of tick bite as well as by differences in the clinical manifestations.

[The negative Weil-Felix reaction, the prolonged fever of an intermittent type and the character of the rash seem to the reviewer to be in keeping with a diagnosis of tick-borne rather than of flea-borne typhus. The results observed in the guineapigs are equally compatible with either of these diagnoses. Mite-borne typhus cannot be excluded by the absence of local lesions though the negative responses to *Proteus* OXA make this diagnosis very unlikely. The complete absence of evidence pointing to the likelihood of tick bite is opposed to though it does not completely exclude the diagnosis of tick-borne typhus. Altogether these cases are good illustrations of the frequent difficulties encountered by practitioners in the differential diagnosis of the non-epidemic typhus fevers.]

J. W. D. M.

JOSOX (Catalino T). Typhus Fever. Some Unusual Clinical Manifestations.—*Acta Med. Philippina* 1941 Apr-June. Vol. 2, No. 4 pp. 403-413. With 6 charts.

Within 3½ years 9 cases of "typhus fever" were seen among the students of the University of the Philippines. No two cases came from the same household and no contact was infected although the patients were treated in the general wards of the hospital without special precautions.

It was, therefore, assumed that the cases were of "tropical typhus fever" as described by FLETCHER in 1925 [see this *Bulletin* 1925 Vol. 22, p. 644].

Some of the special features of the attacks were—one patient had a rather slow onset, one had purulent discharge from the left ear, one had physical signs suggesting a pleural effusion, some had symptoms strongly suggestive of an influenza attack, the temperature curve simulated that of typhoid fever, there were no mental excitement, delirium or meningeal symptoms, only three had skin eruptions, the spots were maculo-papular chiefly on the trunk and neck, there were no deaths, though some of the attacks were fairly severe.

[These were presumably cases of flea borne typhus usually known as murine or endemic typhus. The interest of the paper consists in its containing an account illustrated by temperature charts of this form of typhus about which there have been few clinical reports.]

Boston (Roy J.) *Advances in Methods of Murine Typhus Control*—
Amer Jl Public Health 1941 July Vol. 31 No 7 pp 720-727
With 5 figs. J W D M

Murine typhus fever has recently become a major public health problem in Georgia, where the disease is widespread and increasing. Small towns and villages are specially affected.

The ideal method of rat control by complete rat-proofing of buildings is often impracticable being slow and costly.

The method adopted was vent stoppage by which rats are prevented from getting into the buildings. The first step was to make a survey of all the premises in the affected localities the information being recorded on special forms.

The materials chiefly used for stopping vents were galvanized metal sheets galvanized wire cloth of $\frac{1}{4}$ inch mesh bricks and cement. The average cost for each business establishment was \$3.

On completion of the work trapping of rats inside the premises was carried out at intervals. Garbage control was also effected.

As a temporary measure poisoning of rats by red squill baits was often carried out but this was expensive and the results were only short lived.

Many municipalities in Georgia have carried out vent-stoppage control within a year the incidence of the disease was lessened in places where a rapid increase had been occurring before the adoption of the procedure.

REYNES (V) & RICHARD (J) *Manifestations nerveuses d'atteinte mésentérique et syndrome de névrite ascendante au cours d'une fièvre typho-exanthématique* [Nerve Manifestations due to Lesion of the Mesencephalon and Ascending Neuritis in an Attack of Typhus Fever]—*Rev Méd Française d'Extrême-Orient* 1941 Mar-Apr Nos. 3-4 pp 387-391 J W D M

In the report this interesting case is described as one of an exanthematic typhus fever of the tropical typhus type from the description it appears to have been one of mite-borne typhus fever of the tsutsu gamushi type.

The interesting features of the case are as follows—(1) Very severe nerve manifestations appeared about the 11th day when the temperature was steadily falling. There was stupor and fibrillary twitching of the muscles for ten days then the patient seemed to awake but had choreiform movements and intention tremor for seven days, after which he had a slight recurrence of fever for two days accompanied by lancinating pain in the right side of the neck shooting down the right arm. There was also wasting and loss of power of the muscles of the right shoulder. During the following month there was steady improvement ending in complete recovery. The local nerve manifestations just described were apparently associated with the presence of a necrotic patch which was noticed when the patient was admitted on

the sixth day of his illness and was accompanied by localized lymphadenitis. This patch was a typical *tache noire* and was situated on the lower part of the neck on the right side.

(2) The agglutination response to *Proteus* XK first appeared on the 18th day and reached a titre of 1-1,600 by the 22nd day—the reaction became negative after six weeks. There was also a positive reaction to two strains of *Proteus* X19—this reached the titre of 1-1,600 about ten days later than was the case with *Proteus* XK. It also disappeared earlier. Higher titres than 1-1,600 were not tested, but presumably the reaction to XK was the stronger of the two. The reaction to *Proteus* OX2 was negative throughout.

(3) The Kahn test became positive about the 22nd day and remained positive for about two months. There was no evidence of syphilis.

J. W. D. M.

PATISO-CAMARGO (Luis). Nuevas observaciones sobre un tercer foco de fiebre petequeal (maculosa) en el hemisferio americano. [New Observations on a Third Focus of Petechial (Spotted) Fever in the American Hemisphere.]—*Bol. Oficina Sanitaria Panamericana*. 1941 Nov Vol. 20 No. 11 pp. 1112-1124. With 1 map. English summary. Also in *Rev. Facul. de Med. Bogota*. 1941 Nov Vol. 10 No. 5 pp. 359-376. With 2 maps.

The two previously recognized foci of tick-borne typhus fever in the western hemisphere are—(1) the United States and Canada, (2) Brazil. The disease in Brazil is variously designated by the author as "typhus of São Paulo", "Brazilian rickettsiasis", "spotted rickettsiasis" and "neotropical rickettsiasis." No reference is made in the article to the similar tick-borne fever of Minas Geraes which, presumably, is included in the Brazilian focus.

The author has already described a "spotted fever" in Tobia, Colombia, in 1935. In that outbreak (1934-1936) there were 65 cases with 62 deaths in a population of 287 persons living in a valley just north of the equator at an altitude of 2,300 to 4,100 feet [see this *Bulletin* 1938, Vol. 35 p. 361].

Two recent cases are described—they occurred at a place not far from the previous focus. An account is given of the clinical picture of the disease which resembles the most virulent form of Rocky Mountain spotted fever—in most of the cases death occurred between the fourth and the tenth day—in the few survivors the fever lasted 14 to 17 days. There were several family outbreaks. In one of these six members of a family of seven were attacked between June and October 1934—in another family one person died in September 1934, five in April 1935, one in May, one in October and one in December of the same year. Two patients recovered from attacks in December, these and a baby were the only survivors in the family.

The people of the affected area and their domestic animals were heavily infested with ectoparasites and bed bugs, lice, fleas, mites and several kinds of ticks were found.

Four strains of virus were isolated, two from patients, one from ticks found on a patient and one from a mule belonging to a family in which a case had recently occurred. Rickettsia bodies were found in guinea-pigs inoculated with the virus. Rabbits, *Macacus rhesus* and a local monkey *Cebus satanas*, were also susceptible. The natural vector was *Amblyomma cayennense*—two other local ticks, *Dermacentor*

nitens and *Ornithodoros rudis* were found to be effective vectors. *D. andersoni*, *O. parkeri* and *O. turicata* obtained from Montana, were also found capable of transmitting the disease. *Rhipicephalus sanguineus* is mentioned as being common in the area but no reference is made to experiments with this tick.

Sera taken in November 1940 from 16 persons whose histories suggested the possibility that they might have had mild attacks were sent to Dr. R. R. PARKER, who reported that four showed positive protection [presumably against Rocky Mountain spotted fever] eight showed partial or uncertain protection three were negative and one was not fully tested. Weil Felix tests against *Proteus OX19* OXK and OX2 did not yield positive reactions in dilutions higher than 1-80 in any of the same 16 cases. Experiments are being carried out in Colombia and Montana to find whether cross-immunity exists between the Colombia strain and the Rocky Mountain strain of the virus.

J W D M

TOPPING (Norman H.) A Strain of Rocky Mountain Spotted Fever Virus of Low Virulence Isolated in the Western United States.—*Public Health Rep* 1941 Oct 17 Vol. 56 No 42 pp 2041-2043

A special strain (designated the L strain) of *Rickettsiae* was isolated from a patient who was infected by a tick presumed to be *D. andersoni* in Wyoming. Tested on guinea pigs the strain was of low virulence as shown by a prolonged incubation period, absence of consistent scrotal reaction and a fatality rate of 4.4 per cent, as compared with a rate of 8 per cent which was the lowest yet recorded in guinea pigs inoculated with the mildest strain isolated in the East. The L strain gave complete cross immunity with highly virulent strains of Rocky Mountain fever virus there was no cross immunity to epidemic and endemic typhus or to strains of Q fever.

The author suggests that the geographical classification (i.e. eastern or western type) be dropped and that strains of Rocky Mountain spotted fever should be classified with reference to their virulence to guinea pigs.

He points out that there is no justification for the theory that strains of *Rickettsiae* conveyed by *D. variabilis* are milder than those conveyed by *D. andersoni*. Strains of every degree of virulence are conveyed by ticks of both species.

No mention is made of the duration or severity of the attack in the patient from whose blood the virus was isolated. His temperature was 103.4° two days after the onset.

J W D M

VIOLLE (H.) & JOYEUX (Ch.) Présence d'un virus à *Rickettsias* chez des lapins sauvages [*Rickettsiae* found in Wild Rabbits].—*Arch Inst Pasteur de Tunis* 1941 June. Vol. 30 No 1-2 pp 23-25

Rickettsiae assumed to be those of boutonneuse fever but not identified were isolated from the pooled blood of five wild rabbits caught in Cardarache not far from Marseilles. Similar *Rickettsiae* were recovered from the pooled bodies of a number of ticks (*Rhipicephalus sanguineus*) found on the rabbits.

The blood and the crushed bodies of the ticks were given to rats mixed with their food. There was a slight febrile reaction in the rats, whose brains were inoculated intraperitoneally into guinea-pigs. The brains of the guinea-pigs were inoculated intraperitoneally into rats and Rickettsiae were found in the cells of the peritoneal exudate of the latter animals. No orchitic reaction was observed in the guinea-pigs, but few males were inoculated.

The brains of the wild rabbits were tested in the same way but no evidence of the presence of the virus was found.

The authors refer to the hypothesis of RAYBAUD (1939) that wild rodents might be reservoirs of the infection of boutonneuse fever in the region of Marseilles, also to the view of DURAND [this *Bulletin* 1932, Vol. 29 p. 79] and other more recent observers that the dog is the natural reservoir of the virus.

The authors themselves had already shown that the viruses of boutonneuse fever and murine typhus develop and persist in rabbits, the brains of these animals still being infective up to 4½ months. They regard the present experiments as showing that wild rabbits can harbour a virus responsible for the group of endemic typhus fevers of the South of France.

J. W. D. M.

FINDLAY (G. M.) Pneumonitis in Mice Infected Intranasally with Q Fever.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942, Jan. 31, Vol. 35, No. 4, pp. 213-218. With 12 figs. on 3 plates. (17 refs.)

Pulmonary lesions were produced in mice by intranasal instillation of Australian and American strains of the *Rickettsia burnetii* of Q fever.

Similar lesions had already been produced in the same way with other Rickettsiae. CASTANEDA (1939), DURAND, GIROUD and SPARKOW (1940) and others have reported successful inoculation of mice with the Rickettsiae of murine typhus, exanthematic typhus, Rocky Mountain spotted fever and *fièvre boutonneuse* [see this *Bulletin* 1940 Vol. 37 pp. 281-849].

In the present experiment a ten per cent. suspension of the spleens of mice infected with *R. burnetii* was used. Four drops of this were instilled into the nostrils of white mice anaesthetized with ether. For subsequent passages suspensions made from the lungs of infected mice were used in the same way.

The infection was rarely fatal. Mice which were killed four to ten days after infection showed irregularly distributed nodules of consolidation of the lungs. These nodules were associated with terminal bronchi or bronchioles. The chief histological changes in the lungs were as follows.—The bronchi contained a fibrinous deposit and an exudate consisting largely of round cells. The cells lining the bronchi were prominent but in some places were desquamated. Many of the alveoli were filled with a sero-fibrinous exudate containing few cells, others were almost completely obliterated by swelling of the lining cells and by a heavy infiltration of the interstitial tissues with small lymphocytes and large mononuclear cells. Here and there in the lungs small nodules occurred, they were made up of dense masses of lymphocytes and mononuclear cells with some polymorphonuclear leucocytes and much nuclear debris.

Smears from the lungs showed large numbers of Rickettsiae. In sections these were seen to be situated in large mononuclear cells on the pleural surface of the lung, in the alveoli, and in the lumen of the bronchi.

The findings resembled those recorded in a fatal human case of laboratory infection with Q fever which occurred at the National Institute of Health in Washington [LILLIE *et al* this *Bulletin* 1941 Vol. 38, p 446]

The author also describes the lesions set up in mice by the intranasal instillation of *R. prowazeki* and *R. murina* these were usually more intense, but otherwise were essentially similar to those caused by *R. burneti*.

The article is illustrated with excellent photomicrographs.

J W D M

Cox (Herald R.) Cultivation of Rickettsiae of the Rocky Mountain Spotted Fever, Typhus and Q Fever Groups in the Embryonic Tissues of Developing Chicks.—*Science* 1941 Oct 31 Vol. 94 No. 2444 pp 399-403

The importance and interest of this address* are so great that no apology is needed for giving an exceptionally full abstract

In 1938 the author reported a simple technique by which the Rickettsiae of Rocky Mountain spotted fever and epidemic typhus could be cultivated in the yolk sacs of developing chick embryos. suspensions of infected yolk sacs were found to be from 100 to 1 000 times more infective than the other tissues of the chick embryos or mammalian tissues. In 1938-39 he showed that cultures grown in the yolk sacs yielded good immunizing vaccines for the Rocky Mountain fever epidemic typhus endemic typhus and American Q fever

The present method of inoculating eggs and maintaining strains is as follows —

Fertile eggs incubated for 6 to 7 days at 39°C. are injected in the yolk with infectious material by means of a hypodermic syringe and a 20-gauge needle, 1 to 1½ inches long. The inoculum consisting of 0.5 to 1.0 cc of infected, defibrinated guinea pig blood, testicle washings, spleen or brain is introduced through a needle-sized opening in the air sac end of the egg. After sealing the hole with paraffin, the inoculated egg is incubated at 32°C. in the case of spotted fever or at 37°C. for typhus or the other rickettsial infections discussed in this paper. Upon death of the embryo which usually occurs in 3 to 5 days, depending upon the species of rickettsia used, transfer to other fertile eggs is made by means of 0.5 cc. of a 5 to 10 per cent. suspension of yolk sac in a 50-50 mixture of sterile beef infusion broth and saline or by using a like quantity of undiluted yolk fluid. Passage strains can be maintained by either method. Yolk fluid is satisfactory for maintaining strains, but when the tissues are to be used for vaccine production yolk sac suspension is the preferred inoculum because of its markedly greater infectiveness.

Rickettsiae of all the chief varieties of tick-borne fevers of the typhus group also of one strain of endemic typhus and one of epidemic typhus have been cultivated in the same way and studied by the author.

The method has also been used by others for cultivating rickettsial agents, viruses, bacteria and spirochaetes.

In the first few passages the embryo does not die for a relatively long period and maximum multiplication is not usually obtained before 4 to 6 passages, but strains once established can apparently be maintained indefinitely even in the case of strains which soon die out when transferred through guinea pigs.

* Delivered on September 22nd, 1941 to the Section on Medical Sciences upon receipt of the Theobald Smith Award of the American Association for the Advancement of Science.

Rickettsiae from recently established yolk-sac cultures show a notable increase in virulence to guinea-pigs: the incubation period is shortened, the fever is more intense and the fatality rate is higher. In "orchitic" strains the scrotal reaction is more severe and in "non-orchitic" strains there is often a scrotal reaction. When these virulent strains are passaged through guinea-pigs they resume their normal virulence after 3 to 4 passages.

The yolk-sac technique is of special value because of its extreme simplicity and the ease with which cultures can be maintained with a minimum risk of contamination.

Preparation and Testing of Vaccines—Killed vaccines are best prepared from strains of maximum virulence so that the present practice is to use strains that have been carried through a limited number of passages, e.g. "alternated between a series of 40 to 50 yolk passages and several transfers through guinea-pigs."

The author emphasizes that good vaccines cannot be obtained without using the yolk sac.

The technique now adopted in preparing vaccines is as follows—

Upon death of the embryos (in spotted fever this occurs 2 to 3 days in typhus 4 to 5 days, after inoculation) the pooled embryonic tissues are harvested from all eggs of the same transfer. These are weighed and homogenized to a 12½ per cent suspension in saline containing 0.5 per cent phenol and 0.3 per cent formalin. This suspension is centrifuged at 5,000 r.p.m. for 50 to 60 minutes and the supernatant fluid, which contains the great bulk of lipoids and some soluble proteins, is poured off. The sediment is resuspended with and of the homogenizer in a volume of saline equal to the original weight of the pooled tissues. Phenol and formalin are added to give a final concentration of 2.0 per cent and 0.3 per cent, respectively. The resuspended material is placed at room temperature for 6 to 7 days and shaken vigorously daily. During this interval the great bulk of protein is precipitated by the phenol. The suspension is then diluted with 5 volumes of sterile saline and stored at 36°F. for 7 or more days. It is finally centrifuged at 2,500 to 3,000 r.p.m. for 20 minutes, and the resulting supernatant fluid constitutes the vaccine.

Approximately one liter of vaccine can be prepared from 20 eggs. A bacteriologist and two assistants, provided with proper facilities, can readily prepare from 40 to 50 liters of vaccine per week.

Potency Tests—The potency of epidemic typhus vaccine is tested as follows—

Twelve guinea-pigs are used for the potency test, and each receives two 1 cc. injections of vaccine. The test dose for immunity consists of 1 cc. of a lightly centrifuged (1,500 r.p.m. for ten minutes in an International Sero 2, horizontal head centrifuge) 5 per cent suspension of infected brain tissue taken from guinea-pigs on the fourth or fifth day of fever. Repeated tests have shown that this inoculum contains 100 to 1,000 infectious doses. Temperatures are taken for 18 days, and 9 of the 12 vaccinated guinea-pigs must show complete protection before the vaccine lot is issued.

"Quantitative tests carried out recently with vaccines prepared as described above revealed that guinea-pigs can be completely protected against the standard test dose of spotted fever blood virus by giving them as little as 1/16 cc. of vaccine on two occasions. In other experiments it was found that the standard dose of vaccine used in the spotted fever and typhus tests protected guinea-pigs in each instance against 100,000 to 1,000,000 infectious units of yolk sac virus. These results certainly indicate a high degree of protection. However as previously stated, still more potent vaccines can readily be prepared by simply increasing the relative concentration of yolk sac tissue in the final product."

More than 226 litres of typhus vaccine enough for about 75 000 people were used in field trials last year. The vaccine was sent to Hungary, Rumania, Spain and China. The results are not yet known but there have been no reports of serious reaction even in persons known to be allergic to egg protein. The results are regarded as encouraging.

Formalized suspensions of Rickettsiae of Q fever and epidemic typhus have been prepared and are stable in storage and agglutinable by specific antisera.

Studies are now in progress to determine the availability of rickettsial suspensions for diagnostic skin tests. A strain of Rocky Mountain fever Rickettsiae of low virulence has been maintained in eggs for 240 serial transfers. Yolk-sac suspensions of the 11th and 15th passages were highly virulent for guinea-pigs but from the 50th to the 125th passages the suspensions became markedly less virulent and many inapparent immunizing infections were observed.

For the subsequent 100 passages the strain showed a consistently low degree of virulence to guinea-pigs but even when no reaction of any kind was apparent the animals were found to be solidly immune to massive doses of highly virulent strains. If it should turn out that a high and lasting immunity is caused by the avirulent strain it may eventually be possible to immunize man with modified living strains of Rickettsiae in much the same way as they are now being immunized against yellow fever.

NAUCK (E G) & WEYER (F) Versuche zur Züchtung von Rickettsien in explantiertem Läusegewebe. [Experiments in the Growth of Rickettsiae on Tissue-Culture Media made from Lice.]—*Zent. f. Bak. I Abt. Orig.* 1941 Aug 23 Vol. 147 No 6 pp 365-376 With 4 figs [10 refs.] J W D M

A full account is given of the use of culture media containing tissues of lice, bugs and fleas. Tissues derived from the larvae of lice were found to be the most satisfactory. They kept in good condition for several weeks without showing any multiplication of the tissue cells. Various kinds of Rickettsiae grew profusely especially in stomach tissues. *R. prowazeki* multiplied only when it had already been present in the lice before the removal of the tissues. Lice inoculated *per anum* with the tissue cultures showed only extracellular Rickettsiae and these were neither infective to guinea-pigs nor capable of being grown in subcultures. J W D M

1. FINDLAY (G M) Relationship of Exanthematic and Endemic Typhus.—*Lancet* 1941 Nov 29 pp 659-660 [12 refs.]
ii. LANCET 1941 Nov 29 p 671—Typhus Immunization.

1. Findlay begins with a brief review of the evidence in support of the existence of cross immunity between endemic and exanthematic typhus. He states that murine killed vaccine protects guinea-pigs against the virus of exanthematic typhus the degree of immunity depending on the dose of the vaccine but little is known about the efficacy of inoculation of human beings with Rickettsiae.

In January 1940 Findlay himself, aged 47 received three injections of Weigl's louse vaccine there was no reaction and no evidence of the presence of immune bodies was found, either in the form of a positive Weil-Felix reaction or a positive response to Groux's intradermal test in rabbits.

In April 1940 he had four injections at five-daily intervals of a mouse-lung vaccine prepared by DURAND and GROUX this was a killed vaccine made from the Rickettsiae of epidemic typhus. The Groux test showed that immune bodies were present.

In June 1940 while working with Rickettsiae of exanthematic and endemic typhus he had a mild attack of fever lasting five days with a maximum temperature of 101°F an orchitic strain of typhus Rickettsiae was isolated from his blood taken on the 2nd day of the fever.

A laboratory technician, aged 18, received an injection of mouse-lung vaccine made from killed Rickettsiae of epidemic typhus five days later he had a second dose one day after this he was attacked by fever which lasted a fortnight with a maximum temperature of 103.8°F.

An orchitic strain of Rickettsiae was isolated from his blood.

Findlay's attack was apparently modified by immunity resulting from the previous inoculations.

The "unrehearsed human experiment therefore bears out the contention that there is a close antigenic similarity between rickettsiae of exanthematic and endemic typhus" and that the relationship between these is quantitative rather than qualitative."

ii. Methods of typhus immunization are briefly reviewed in an editorial article which has obviously been written by a competent authority on the subject. A commendably conservative attitude is maintained as is shown by the remark that "little is yet known about typhus immunization on a large scale."

Weigl's killed louse-vaccine has been in use for a considerable time some hundreds of lice are needed for the immunization of a single person, the technique is delicate and numbers of immune persons must be available to provide nourishment for the thousands of lice that have to be fed. For large-scale preparation of the vaccine a whole institute is necessary.

Immunization on a large scale has been carried out in Morocco and Tunis by the injection of living murine virus immunity is often acquired at the expense of an attack of murine typhus which, though not so dangerous as epidemic typhus is not to be despised. Another drawback is that in louse-infested communities there is a possibility of the strain being converted to one of epidemic typhus by passage through lice.

Killed vaccines prepared by the methods of Cox and of Durand and Groux have been employed, but hitherto on a small scale they necessitate four or five injections and their actual value in the field is not yet known.

The duration of immunity resulting from killed vaccines is probably not more than a year. Immunity should be tested not only by the Weil-Felix reaction but also by the agglutination test (presumably with Rickettsiae) and by Groux's intradermal test in rabbits.

Both Weigl's vaccine and mouse lung vaccine lose much of their antigenic power after 3-6 months, even when kept in the ice-chest.

J. W. D. M.

EVER (H.) PRZYBYLKIOWICZ (Z.) & DILLENBERG (H.) Das Fleck
fieber bei Schutzgeimpften. [Typhus Fever after Protective
Inoculation.]—*Ztschr f Hyg u Infektionskr* 1940 Nov 22
Vol. 122. No 6 pp 702-719 With 15 figs

Fifteen cases of laboratory infection with typhus fever occurred among the personnel of a German Military Institute in Cracow where Weigl's vaccine was being prepared from artificially infected lice. The onset in 8 cases was between the 8th and 28th May 1940 in 6 it was in June and in 1 in July.

In three cases the infection must have been conveyed by the bites of infected lice which were being fed on the patients for 9, 13 and 15 days respectively before the onset of the attacks. These three cases were of 12 to 19 days duration and were rather severe although the patients had been inoculated with Weigl's original vaccine on two occasions within the previous four months.

In another case the source of infection was something of a mystery the patient had been engaged in supplying blood feeds to infected lice for two months before the onset but also had been handling the faeces of infected lice. His attack was the longest (15 days) and most severe of those recorded. He had been inoculated twice with Weigl's vaccine.

The remaining 11 cases ranged in duration from 5 to 10 days. The patients had not been bitten by infected lice but were engaged in preparing vaccine and so must have been infected with the dried faeces of lice. Seven of the patients had been inoculated on one occasion with Weigl's original vaccine within the previous five months three had been twice inoculated and one had been inoculated six months previously and also had an attack of typhus fever two months before the onset. The three patients who had been twice inoculated and the one who had a previous attack escaped with exceptionally mild attacks lasting five to eight days.

In view of the very heavy doses of infection that must have been received the author concludes that the vaccine had conferred a considerable degree of immunity which would probably have been sufficient to prevent recognizable attacks of typhus in persons infected in the usual way. He holds that the efficacy of the vaccine has been thoroughly established by the results of large-scale trials in the field.

The serum-agglutination test with suspensions of *Rickettsiae* was found to be more specific than the Weil-Felix reaction. It became positive at an earlier stage and also became negative sooner after the fall of the temperature. Thus reaction known as Weigl's R.A. test is regarded as diagnostic when it is positive in titres of 1-50 and over the Weil-Felix reaction is diagnostic in dilutions of 1-100 to 1-200 and over.

J IV D M

MED WELT 1942. Jan. 3 No 1 p 26 Limited Possibilities of Typhus Vaccination.

At a meeting of the Berlin Medical Society GELLMEISTER reported that the Weigl vaccine against typhus fever made from the louse gut cannot be produced in sufficient quantities. The new vaccine of Otto-Gellmeister-Hagen is easy to produce but has not yet been proved in the field. It appears that it will never be possible to carry out protective inoculation against typhus in the same extensive

manner as can be done for typhoid. Only those persons specially exposed to the danger of infection should be vaccinated.

W P Kennedy

PECHTEL (C.) Eubasin-Effekt bei einem Fall von Wolhynischem Fünftagefieber [The Effect of Eubasin (Sulphapyridine) in a Case of Wolhynian Five-Day Fever (Trench Fever)]—*Med. Klin.* 1940 Nov 29 Vol. 38. No. 48. p. 1331 With 1 chart.

The patient had been engaged on harvest work in the company of a Pole. The fever was of an irregular relapsing type in which the periodicity varied between three and five days. The symptoms corresponded to those described in trench fever and had persisted for two months before admission to hospital. After admission to hospital there were five further spells of fever on the 1st, 6th, 8th, 14th and 17th days respectively.

The serum agglutinated *Proteus X19* up to a titre of 1-100.

Sulphapyridine treatment was started two days after the last paroxysm of fever. 15 grammes were given in four days. The symptoms yielded promptly and there was no return of the fever.

J W D M

PÉRA YAFEZ (A.) Ueber den Einfluss von Antimonsalzen auf das Fünftagefieber [The Use of Antimony Salts in Trench Fever]—*Deut. Med. Woch.* 1941 Nov 14 Vol. 67 No. 46. pp. 1267-1268 With 3 charts.

The author treated eight cases of trench fever during the Spanish civil war by means of tartar emetic, with good results. The doses used were from 8 to 14 cc. of a 1 per cent. solution, given intravenously each day for seven days and if necessary repeated after an interval of a week. Diagnosis was made on the typical temperature curve. Charts of three patients are shown. In two a single course of the drug sufficed for cure, in the third there was a slight recrudescence which yielded to a second course.

C H

HOWE (Calderon) Demonstration of Agglutinins for *Bartonella bacilliformis*.—*Jl. Experim. Med.* 1942 Jan. 1 Vol. 75 No. 1 pp. 65-75. With 2 figs. [10 refs.]

A satisfactory agglutination test for bartonellosis (Carrion's disease) is now available for the first time. Hitherto it has been impossible to prepare suitable suspensions of *Bartonella bacilliformis* but two media devised by GRISMAN (*Proc. Soc. Experim. Biol. & Med.* 1941 Vol. 47 p. 329) yield cultures from which homogeneous suspensions can be obtained. Details of these media and of the method of preparing the suspensions are given. [See also this *Bulletin* 1942, Vol. 39 p. 156.]

By repeated intravenous injections of live cultures of *B. bacilliformis* into rabbits a strongly agglutinating serum can be obtained. The sera of five immunized animals gave positive reactions in titres of 1-160 to 1-640. Sera from six patients in various stages of bartonellosis also agglutinated the organisms, but at much lower titres, ranging from 1-10 to 1-80. These reactions were significant because 13 control sera of healthy persons showed no agglutinins.

The six positive sera were also tested against *Proteus* OX19 OXK and OX2. Some of these sera showed significant amounts of agglutinins against all three organisms three reacted in titres of at least 1-64 to OX19 one to OXK and three to OX2. No conclusions could be drawn from these reactions but the highly immunized guineapigs gave entirely negative reactions to all the *Proteus* organisms

J W D M

MALARIA

FELLOWS (Frank S) & PERRY (William B) Syphilis-Malaria Survey, Onslow County North Carolina.—*Veneral Dis Informa* tion. 1941 July Vol. 22 No 7 pp 237-247 With 2 figs [Summary appears also in *Bulletin of Hygiene*]

Various surveys carried out in N Carolina have differed in their estimates of the amount of syphilis and malaria there. That under review which was conducted in Onslow County from August 1939 to April 1940 was to determine not only the prevalence of syphilis and malaria there but also the effect of malaria on the syphilitic serum reactions. Onslow County was chosen as one in which hitherto little anti-malarial or anti-syphilitic work had been organized. Its population in 1930 was 15,289 and of these 26.6 per cent were negroes the survey was conducted entirely amongst the negroes of whom 80 per cent were tested by serological tests of venous blood and microscopic examination of thick films of finger blood. Positive and doubtful results led to re-tests and eventually it was decided that 9.9 per cent gave positive reactions to syphilis tests and 5.0 per cent doubtful. These results show a lower prevalence of syphilis in negroes than in some similar communities elsewhere e.g. Tennessee and Georgia each with 26 per cent though the percentage in Mississippi was 7.1 and in Virginia 9.7. In Onslow County the percentage varied with different districts from 0 to 23. The generally low prevalence may be due to the fact that the population is very stable and there is no evidence of any great influx from outside. Analysis by marital status showed the highest prevalence in the separated group and next in the married and widowed 17.2 per cent of housewives were infected. Amongst many points illustrated in the ten tables it appeared that 81.3 per cent. of the positive cases had had no previous treatment. The histories showed that 16 had been found positive within a year before the survey but only four cases of syphilis had been notified to the health authority. In women over 20 those with syphilis had had an average of 3.5 pregnancies each as compared with 4.4 in the non-syphilitic group. Of the syphilitic women aged over 20 81 per cent had conceived as compared with 85 per cent. of the negative reactors probably the authors say showing a higher sterility rate in the syphilitic woman. In those who had conceived, the syphilitic women had an average of 4.3 pregnancies each as compared with 5.2 in the non-syphilitic.

Malarial parasites were found in 3.1 per cent. of the 3,244 negroes so examined and the commonest parasite was *P. falciparum* (93.1 per cent). Malaria has been notifiable since 1937 but although the authors estimate that 200 cases must have been treated for it in the year before the survey only five had been reported from the beginning.

eight deaths had occurred since 1837. Of the persons in whom malarial parasites were found, 77 per cent. were under 20, 72 per cent. being of pre-school or school age. Details are given of both malaria and syphilis by districts and occupational status. As regards the question of the influence of malaria on the syphilitic serum reaction it is noted that 10.9 per cent. of the malarial group (with parasites) had positive serum reactions and 23.8 per cent. doubtful, which compares with 7.5 and 5.6 respectively in the non-malarial. In the group with malarial parasites in the blood 64.8 per cent. of those who gave a positive or doubtful reaction with the first syphilitic serum test showed a change in the reaction with subsequent tests: 5.4 per cent. from positive to doubtful, 27 per cent. positive to negative, 29.7 per cent. doubtful to negative and 2.7 per cent. doubtful to positive. In contrast with this only 24.9 per cent. of the non-malarial group giving positive syphilis reactions showed any change on subsequent testing. The authors discuss also reasons for those giving a history of malaria giving a higher percentage of positive syphilis reactions than those with no such history and suggest that natural malaria may cause false positive reactions for longer than the 66 days which KITUMU *et al.* showed them to persist after disappearance of parasites following therapeutic malaria.

L. W. Harrison

FAUST (Ernest Carroll) *Malaria Mortality in the Southern United States for the Year 1939 with Notes on Malaria in Other States.*—*Southern Med J* 1941 July Vol 34 No. 7 pp 708-709

In all of the United States except the South endemic malaria transmitted by mosquitoes is due to *Plasmodium vivax*. Imported cases from the South or tropical America frequently harbor *Plasmodium falciparum*.

Summary

Malaria mortality in the Southern United States for the year 1939 was apparently the lowest on record—it was 20 per cent. lower than for 1938 and 30 per cent. lower than the previous low of the 5-7 year cycle of malaria mortality. In the relatively few counties in the South with significant increase in malaria deaths in 1939 over 1938 there is suggestive evidence of radial distribution of the infection from near-by highly endemic foci. Outside the South, Illinois is the only state with a significant number of malaria deaths during the past three years. However many of the Northern and Western states have indigenous malaria. In Iowa, Illinois, Wisconsin and southern Minnesota mild epidemics developed in Counties near the Mississippi River during the summers of 1938 and 1939. Moreover transient laborers, CCC camp enrollees, tourists returning from the South and tropical America as well as patients with malaria who are sent to the North and West to recuperate all constitute increasing sources for introducing the infection into previously non-malarious localities.

YAO (Y. T.) & WU (C. C.) *On the Peculiar Morphology of the Malaria Parasite from a Patient and the Possibility of its being Plasmodium ovale.*—*Chinese Med J* 1941 Aug Vol 60 No 2, pp. 178-183. With 4 plates (2 coloured).

A patient, aged 21, was admitted to Kun Hua Provincial Hospital, Kunning, China, suffering from fever associated with the presence in

the blood of *Plasmodium falciparum* (rings and crescents) and of another malarial parasite which appeared to exhibit all the features of *P. ovale*. The patient on admission was acutely ill but quickly responded to treatment with quinine atebryn and plasmoquine. The illness was not of such severity that growing forms and schizonts of *P. falciparum* would be present in the peripheral blood. This would exclude the possibility that the parasites assumed to be *P. ovale* could be stages of *P. falciparum*. The *P. ovale*-like forms included all stages of development from rings to mature schizonts and gametocytes which are illustrated in a coloured plate and two plates of microphotographs. The main features are stippling of infected cells oval shape of parasite and cells many of which have frayed edges failure of cells to enlarge mature parasites schizonts and gametocytes not completely filling the cells number of merozoites 8 to 12. All these features are consistent with a diagnosis of *P. ovale*. The authors are guarded in their final conclusion which is that there is the possibility of the presence of *P. ovale* in China.

C. M. Wenyon

BATES (M.) Field Studies of the Anopheline Mosquitoes of Albania.—
Proc. Ent. Soc. Wash. 1941 Vol. 43 No. 3 pp. 37-58
With 7 figs. [15 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B 1942. Feb. Vol. 30 Pt. 2. pp. 29-30.]

Field observations on the Anophelines of Albania made between 1936 and 1939 in connection with the programme of the laboratory for mosquito research in Tirana are summarised. Those found comprised *Anopheles algeriensis* Theo. *A. claviger* Mg. *A. hyrcanus* Pall. (possibly subsp. *pseudopictus* Grassi) *A. marleri* Senevet and Prunelle *A. plumbeus* Steph. *A. superpictus* Grassi and four members of the group of *A. maculipennis* Mg. (vars. *messae* Flni *sacharovi* Favr. *subalpinus* Hackett and Lewis and *typicus*) for which the author adopts the nomenclature he proposed in a recent paper. Brief notes are given on their local distribution and also keys for the identification of the eggs and fourth-instar larvae. The larvae of the *maculipennis* group can in most cases be identified by means of the variation in the antepalpal hairs and a table is given to show how this method of identification is applied to field material.

As in Greek Macedonia, intense malaria in Albania is associated with *Anopheles maculipennis* var. *sacharovi* but the disease also occurs in areas where this form is not found and it then appears to be carried by *A. superpictus*. It is also found in a few places, notably on the shores of Lake Malis, where the only common mosquitos are *A. maculipennis* vars. *typicus*, *messae* and *subalpinus* which are generally supposed not to be vectors because they do not readily attack man. The villages are very near the lake where the mosquitos breed in immense numbers.

Larval habitats were studied in detail only for the members of the *maculipennis* group. Of these var. *subalpinus* which occurred all over the country but bred only in marshes and ponds has the most limited habitat. It was never found in heavily shaded situations in water with a small surface area, high nitrate content or appreciable salinity or in water free from vegetation or subject to strong surface movements. The limitations of var. *messae* were similar and moreover its geographical range in Albania is very limited possibly

because of the effect of the maximum summer temperature on the adults. Var *sackarovi* though typically a marsh breeder was found in small bodies of water such as pools and ditches, and in water containing slightly more than 2 per cent. sodium chloride, but is subject to the other limitations. The geographical range of this form also is limited, possibly through the effect of minimum winter temperatures on the adult. Var *typicus* was found all over Albania in a wide range of habitats, but in general the limitations were the same as those for *subalpinus* except for that of area of water surface. *A. superfluous* which breeds typically in the small pools in gravelly river beds, is thus not subject to the limitations of vegetation and surface movement. Late in the season, when the adult population has reached its maximum, the eggs may sometimes be found in very varied habitats including small pools and rice-fields. *A. hyrcanus* and *A. algeriensis* were most abundant in a large marsh. Larvae of *A. plumbeus* were found only in tree holes. In the summer *A. davisii* was found only in shaded spring fed pools but in the winter and early spring, it occurred in many types of habitat. The pools in mountain streams in which *A. warreni* breed were characterised by heavy shade, low temperature and clear fresh water. The field study of the eggs was found to be the most useful way of defining the breeding places of the various members of the *maculipennis* group. The author believes therefore that the ecological distribution of *Anopheles* depends on selection of the oviposition site by the female.

The seasonal distribution of adults of var *typicus* as previously determined was compared with larval distribution. The decline in the numbers of adults during July was first attributed to the fact that many of the breeding places near Tirana, where the survey was made dry up at this time. However when in 1937 a small permanent stream was dammed to form a shallow pool that could be kept at a constant level throughout the summer the larval population in the pool declined at a similar rate to the adult population, beginning slightly earlier and there was no great increase in the number of first-instar larvae after the peak in the adult population. These results were thought to indicate that the drop in population is largely due to a high mortality of adults, probably on account of high temperature and low humidity. In each of the years 1933-37 the peak of the population preceded the peak in mean temperature. The technique used for counting the larvae is described.

Data on the relative numbers of larvae in different instars were collected for various breeding places and seasons on the theory that the ratio between instars might be fairly constant during the period of continuous breeding and that variation in it might throw light on seasonal changes of population. Ratios are given for larvae from five breeding places of var *typicus* in Albania, in two of which vars. *messeur* and *subalpinus* also occurred, and for var *atroparvus* var Thiel, in Portugal according to Lambournac. The ratio in var *typicus* varied considerably from one breeding place to another and would even appear to be more useful as an index of differences between breeding places than in the study of seasonal variation. On the basis of observations on the duration of the various instars of var *atroparvus* when reared in a favourable medium, which are discussed, the percentage of larvae in the four instars in an area of continuous breeding with no mortality should be 16, 20, 24 and 40 respectively. In the natural breeding places these ratios were with one exception, more or less

reversed, the greatest number of larvae being in the first instar and this suggests an interesting approach to some of the problems of larval ecology
[See also this *Bulletin* 1941 Vol 38 p 558.]

RUSSELL (Paul F) & MOHAN (Badri Nath) *Experimental Malaria Infections in A. stephensi from Contrasting Sea-Water and Tap-Water Larva Environments*—*Amer J Trop Med* 1941 July Vol 21 No 4 pp 553-558 [11 refs.]

The authors have previously published reports which show that the chemical character of the water in which *A. stephensi* breeds has little or no influence on the susceptibility of adults to infection with *P. falciparum* [see this *Bulletin* 1940 Vol 37 p 359] This is a continuation of that work. Starting with ova from tap-water colonies the authors were gradually able to establish colonies in water containing as much as 80 per cent. sea water. It is interesting to note that the larvae of *A. stephensi* developing in high concentrations of sea water showed marked shortening of the anal papillae.
A total of 260 adult *A. stephensi* from tap-water and 330 from sea water larval environments were fed on gametocyte carriers in eight lots. In one lot all the mosquitoes failed to become infected. The sporozoite indices in the remaining 221 tap water and 298 sea water *A. stephensi* were 27.1 and 31.9 per cent respectively. The highest sporozoite indices in any single lot being 71.2 and 81.6 per cent respectively. Once more it is shown that chemical changes of larval environment do not modify the capacity of emerging *A. stephensi* to transmit *P. falciparum*.
Norman White

BRAMBILLA (Alberto) *L'anofelismo nella zona di Dure Dava (Harar) Prima nota. [Anopheline Prevalence in the Dirre Dava Region (Harar)]*—*Riv di Malariaologia* Sez. I 1941 July-Aug Vol 20 No 4 pp 271-293 With 20 figs English summary (7 lines)

In a previous communication the author dealt with malaria prevalence and anophelines in Dirre Dava [this *Bulletin* 1941 Vol 38 p 709]. He now reports the results of an anopheline survey carried out during 1939 in the country surrounding Dirre Dava within a radius of about 100 kilometres. Twenty photographs of *Anopheles* breeding places illustrate the text. The report does not lend itself to summary. Eight species of *Anopheles* were found. *A. gambiae* was most prevalent in order of prevalence were *A. d'itali*, *A. pretoriensis*, *A. cinereus*, *A. turkhu*, *A. demelloni*, *A. garuhami* and *A. rhodesiensis*.
N W

HOPKINS (G H E) *The Range of Flight of Anopheline Mosquitoes.*—*East African Med J* 1941 Sept Vol 18. No 6 pp 175-183

A very high incidence of malaria among staff and pupils at Busoga College situated on the summit of Mwiru, an isolated hill two miles to the north of Lake Victoria led to an investigation of the source of the mosquitoes concerned. Fairly large numbers of *Anopheles funestus* were found in the College and no breeding places could be discovered nearer than the swamps along the lake-shore two miles away where
(161)

breeding was exceedingly prolific. Observations on the wind showed that this regularly blows from the lake until about 11 p.m. These factors of wind and abundance of mosquitoes were clearly responsible for extending the effective range of *Anopheles* up to two miles in this locality. But the author holds that in most localities half a mile will give adequate protection against this species, maintaining that it is better to control thoroughly a small area than to dissipate our energies by attempting partial control over a larger area.

V. B. Hugglesworth

SMITH (Gordon E.) WATSON (Robert Briggs) & CROWELL (Robert L.)
Observations on the Flight Range of *Anopheles quadrimaculatus*
Say—*Amer J Hyg* 1941 Sept. Vol. 34 No. 2 Sect. C.
pp 102-113 With 2 figs.

The authors discuss some observations on the range of flight of *Anopheles quadrimaculatus* in Tennessee.

They staked 3,800 mosquitoes of this species and liberated them at one spot in the course of two months. Only six were recovered, all between 130-900 yards from the point of liberation. Certain field observations are recorded on the proximity of places where adults could be collected to breeding sites, also on the distribution of malaria in houses at different distances from the lake. All the work is consistent with what is already known about this species elsewhere in the U.S.A. for there is a considerable body of evidence that it never ranges very far though flights up to 1½ miles have been recorded. [It is interesting to contrast the range of flight of this insect with the much greater range of the very similar *Anopheles maculipennis* in Mediterranean countries.]

The paper contains nothing to indicate whether *Anopheles quadrimaculatus* flies much greater distances in the autumn before it commences to hibernate.

P. A. Buxton

BORN (Mark F.) On the Temperature of Incubation for Anophelines Infected with *Plasmodium falciparum*—*Amer J Trop Med* 1941 Sept Vol 21 No 5 pp. 689-694

If *Anopheles* are infected with *Plasmodium falciparum* and kept at 20°C one obtains a lower proportion of infections and a smaller number of oocysts than if one incubates mosquitoes infected with *P. vivax* at the same temperature.

It is found that (using *Anopheles quadrimaculatus*) at 28°C the number of oocysts obtained is higher than at 20°C though the percentage of mosquitoes infected is about 62 at each temperature. At the higher temperature sporozoites are first found on 9th-15th day at the lower on 19th-24th.

P. A. B.

QUATTRO (Nerio) Ricerche sull'inoculazione del parassita malarico per via intramedullare [Intramedullary inoculation of Malaria Parasites].—*Riv di Malariologia* Sez. I 1941 July-Aug Vol 20 No 4 pp 229-237 French summary.

Nine patients requiring malaria therapy were the subjects of the experiments described in this paper. Stereotyped punctures were performed and infected blood from malaria patients was injected into the sternal medulla. The blood was taken from patients, who had been

infected with *P. vivax* either intravenously or intramuscularly during their fifth or sixth febrile attack, a period in which in the experience of the author the peripheral blood has maximum infectivity. The amount of blood so injected was from 3 to 8 c.c. At intervals of from 10 to 180 minutes after the injection specimens of bone marrow were taken for microscopic examination. It was found that infected blood disappears from the sternal bone marrow very rapidly. Parasites were found only three times in 22 very prolonged examinations of marrow preparations. These positive findings were in preparations made 15, 40 and 70 minutes after the inoculations. These rare parasites showed no abnormality of structure or staining reaction or relationship to the red cells which sheltered them. No parasites were ever found either in myeloid cells or in reticulo-endothelial cells.

Three of the 9 patients failed to give any clinical evidence of infection in spite of having received 6, 7 and 8 cc respectively of heavily infected blood. The incubation period in four of the six successfully infected patients was 8 days; in the remaining two patients it was 6 days and 12 days respectively. The incubation period with intravenous inoculation of similar infected blood has generally been in the author's experience from 3 to 4 days. N IV

SOUTHWELL SANDER (G) & HAND (R. F.) Observations on Some Cases of Malaria.—*Jl Roy Nav Med Serv* 1941 July Vol. 27 No 3 pp 300-307

This paper gives detailed accounts of seven cases of malaria, all of which presented interesting features. In one the authors were fully justified in making a diagnosis of acute malaria in spite of the fact that at no time were parasites discoverable in the peripheral blood. In two cases of pernicious malaria and in one which gave rise to symptoms of blackwater fever the paucity of parasites in the peripheral blood afforded no indication of the severity of the infections. In one case the symptoms and signs at the onset simulated those of pneumonia; in another those of a severe streptococcus septicaemia. In these treatment with sulphonamides produced improvement, but a cure was not effected until the malaria infections were discovered and antimalaria therapy instituted.

In nearly all the cases there was a rise in the sedimentation rate. In two cases this was noted about a week after the onset of clinical symptoms. The rate falls to normal after adequate treatment. One case suggests that the persistence of a high sedimentation rate after treatment may indicate the persistence of infection and the probability of a relapse. N IV

STILL (R. M. Lloyd) & LAL (T. N.) A Case of Cerebral Malaria with Rare Complications and Complete Recovery.—*Indian Med Gaz.* 1941 July Vol. 78 No 7 pp 418-419

The patient, a Punjabi woman of 18, was admitted to hospital with pyrexia and developing coma. rings of *P. falciparum* were found in the blood. She was given intravenous quinine but became fully comatose. The next day the temperature was lower and the patient regained consciousness but was unable to speak and the aphasia persisted. On the fifth day hemiplegia of the right side developed though the temperature was normal. Anti-malaria treatment had been given

continuously and was now combined with iodides and massage and the patient regained the use of her leg in about a fortnight. Speech and the use of the arm came back gradually and the patient was discharged cured after about six weeks. The malaria infection was never heavy.

C IV

KUTSCHERA AICHBERGEN (Hans) Sepsis mit malaria-ähnlichem Fieberverlauf. [Sepsis with a Febrile Course simulating Malaria.]—*Wien Klin Woch.* 1941 Aug 8. Vol. 54 No. 32, pp 666-667 With 1 chart.

Two cases are recorded in which the febrile course was strongly suggestive of malaria. In both cases a diagnosis of gonococcal septicaemia was made on the strength of a positive Müller-Oppenheim reaction but without any other evidence of gonococcal infection.

Both of the patients were treated with albucid (a sulphonamide preparation). In one case after a month's illness a complete cure was effected by four intravenous injections of the drug, given in doses of 10 cc. daily.

The other case is reported in detail. The attack began suddenly with high fever. By the fourth day there was pain and swelling of one knee joint. After six days' treatment with salicylates the fever and swelling subsided.

About a fortnight later the fever returned. For two weeks the temperature chart showed a quartan periodicity; then for a week it was tertian.

Although no parasites were found, quinine was given for five days and the fever became of an irregular quotidian type. Eight days after the end of the course of quinine the temperature became higher than ever and was again tertian in type. The fever yielded promptly but temporarily to albucid, of which 63 tablets were given in six days. Two days after the end of the course of albucid the temperature rose again and there were two paroxysms with tertian periodicity. The fever again yielded to albucid and the temperature remained subnormal for five days, but within two days of the end of the second course of the drug the temperature rose again and high remittent fever continued till the death of the patient four days later.

The post-mortem examination showed endocarditis with disorganization of the left aortic valve from which cultures of pneumococci were obtained. These organisms were regarded as secondary invaders in a case which was primarily one of gonococcal septicaemia.

The author refers to six recorded cases of non-malarial tertian or quartan fever. In only one of these was the cause found—a meningococcus. He also mentions that French observers 40 years ago described a "fièvre pseudopalaustre gonococcémique" (pseudo-malarial fever due to gonococcal septicaemia).

John IV D. Meigs

AKASHI (Kazuyoshi) & So (Teijo) A Simple Sero-Diagnostic Method for Malaria.—*Terran Igakkei Zasshi* (Jl Med Assoc Formosa) 1941 July Vol. 40 No. 7 [In Japanese pp. 1292-1300 [17 refs.] English summary p. 1301]

The test is performed as follows—0.2 cc. serum from the patient is mixed with 1.0 cc. distilled water made faintly alkaline to phenolphthalein, and 0.1 cc. of 0.5 per cent. formalin. The mixture is

haken and allowed to stand at room temperature for 2 hours. A sky appearance on examination with a lens indicates a positive sult

In malaria the test is always positive after 3 or 4 days from the onset d is especially pronounced in chronic cases in which treatment has not been adequate it becomes negative a month or two after cure It is also strongly positive in certain forms of jaundice hepatic cirrhosis eruptive fevers measles and kala azar and slightly positive in certain cases of splenomegaly pernicious anaemia leukaemia, typhoid rheumatic arthritis malignancy and in cases of the Wassermann positive diseases These it is claimed are easily differentiated from malaria. There appears to be an increase of serum euglobulin in positive cases the test is a variant of the Henry test

C IV

COGGESHALL (L T) MAIER (John) & BEST (C A.) The Effectiveness of Two New Types of Chemotherapeutic Agents in Malaria Sodium P,P-Diaminodiphenylsulfone N,N-Didextrosulfonate (Promin) and 2-Sulfanilamido Pyrimidine (Sulphadiazine) — J Amer Med Assoc 1941 Sept 27 Vol. 117 No 13 pp 1077-1081 With 5 charts [Refs in footnotes.]

This is a contribution to the search for more effective antimalaria remedies than any yet known. Coggeshall has already shown that sulphanilamide is capable of eradicating *P. knowlesi* infections in rhesus monkeys but that it has little or no effect on human *P. vivax* infections or on *P. lophurae* and *P. catheherium* infections in birds [this Bulletin 1939 Vol. 36 p 824] Attempts are being made to find some related substance that may have an action on human infections similar to that of sulphanilamide on *P. knowlesi* infections in monkeys. The present paper deals with promin and sulphadiazine the chemical constitutions of which are set out in the title above

Promin was found to be as effective as sulphanilamide or its derivatives against *P. knowlesi*, *P. cynomolgi* and *P. vivax* infections in rhesus monkeys. Next it was shown that promin possesses definite antimalaria activity against induced *P. vivax* infections. Five patients undergoing malaria therapy were the subjects of this part of the inquiry. Finally 17 patients suffering from naturally acquired malaria were treated with promin at the Gorgas Hospital. Five were *P. falciparum* infections 12 *P. vivax*. The dosage of the drug varied from 10 gm. to 40 gm. a day intravenously for not more than four days [this seems to be an enormous dose but is correct according to the original] It is pointed out that 1 gm. of promin contains only 0.31 gm. of active agent the remainder being the inactive dextrose-sodium sulphionate radical. Toxic reactions to the drug were minimal two patients had a moderate degree of cyanosis which disappeared when the drug was discontinued. The drug is excreted extremely rapidly. Promin had a definite action on both forms of parasite but *P. vivax* was more resistant than *P. falciparum*. Infections in negroes were more responsive than infections in the relatively non-immune white patients. Sulphadiazine was used in the treatment of 13 negroes suffering from naturally acquired acute malaria seven *P. vivax* five *P. falciparum* and one *P. malariae* infections. The dosage was 6 gm. the first day and 4 gm. daily for the next five days it was given by mouth at four-hourly intervals during the day time. In three patients two

with *P. falciparum* and one *P. vivax* infection, the drug was of no avail in the remainder fever and parasites disappeared during the treatment.

The authors conclude that there are no reasons for giving either pro-mun or sulphadiazine in preference to quinine or atabrin for the treatment of malaria but both may be looked on as important substitutes.

N IV

ROSE. Malaria prophylaxe mit Atabrin, ihre Dosierung und angeblichen Komplikationen [Malaria Prophylaxis with Atabrin Dosage and Alleged Complications].—*Dtsch Med Woch* 1941 Nov 28 Vol 67 No 48 pp 1306-1308.

Rose is unequivocally in favour of the daily administration of atabrin if only because administration of larger doses once or twice each week is apt to be forgotten in military communities. He advocates a daily prophylactic dose of 0.06 gm and has had tablets of this strength prepared, but cannot as yet give definite figures of results obtained. The dose is however higher than that often used (0.05 gm).

This method of prophylaxis was used during the Balkan campaign of the present war and the drug was alleged, by some of the men and doctors alike to have a cathartic action. Rose points out however that in the Mediterranean area dysentery of the Flexner type and milder forms of diarrhoea, are not uncommon and that it is to these infections that the symptoms attributed to atabrin must be ascribed. [Names given to these conditions—Climatic diarrhoea, Crete Salonika or Cyrenaica disease remind one of the Egyptian "tummy" so well known to our own men.] Rose is at some pains to emphasize that in the 10 years during which atabrin has been commonly used no such symptoms have been attributed to it and that even in large doses it has no fever producing effect.

He reproduces a table of dosage and effects recorded by a number of workers (including British) on atabrin prophylaxis.

C IV

McMAHON (J. C.) A Brief Summary of the Results of Tests carried out on Certain Oils against Mosquito Larvae.—*East African Med J* 1941 Nov Vol 18 No 8 pp 240-241.

The standard oil recommended for use in Kenya consists of 8 parts Shell diesel oil and 1 part Shell solar (gas) oil under normal conditions this gives 100 per cent kill of larvae in 90 minutes at a dosage of 12 gallons to the acre. The author has made tests of used motor engine oils and compares the results with those of the standard oil. The used motor oils have no toxic properties and kill only by cutting off air supply at twice the dose of the standard oil their results after 90 minutes were negligible after 24 hours the results were very variable. Except in very heavy dosage usually impracticable and uneconomical, these oils cannot be relied upon. The addition of kerosene must be heavy to produce reliable results with less than 50 per cent. kerosene these mixtures are very slow in action. The addition of kerosene to used motor oil is therefore uneconomic.

C II

LEE (David B.) **Experimental Wells. Their Use in the Study of the Water Table in Relation to a Malaria Control Drainage Program.**—*Southern Med J* 1941 Aug Vol. 34 No 8 pp 840-844

An experimental well is a hole dug in the ground 6 to 8 inches in diameter lined with concrete subsoil pipes the lower end of each pipe being notched to permit entry of ground water. The hole is dug deep enough so that it always contains water even after drainage is instituted. A bench mark is set level with the top of the uppermost pipe. The study of the water table thus facilitated enables one to demonstrate the actual needs of malaria control drainage. In an area chosen for drainage in Pensacola Florida, 25 such wells were constructed in appropriate localities. daily readings were made for about one and a half years. The author describes how such observations enabled great economies to be made in carrying out a costly scheme. Two lessons learnt were. Before and during drainage study the water table by means of wells. Study the effects of a minimum drainage system before starting on any but obviously necessary fill.

N IV

MARTINS (Miguel L.) **Considerações sobre a profilaxia da malaria.** [The Prevention of Malaria.]—*Folha Med* 1941 May 5 Vol. 22 No 9 pp 100-104

MAIER (John) & COGGESHALL (L. T.) **Respiration of Malaria Plasmodia.**—*Jl Infect Dis* 1941 July-Aug Vol. 69 No 1 pp 87-96 With 15 charts.

Continuing the work of CHRISTOPHERS and FULTON (this *Bulletin* 1938 Vol 35 p 709 1940 Vol 37 p 190) the authors have devised a method of estimating the oxygen absorption of malarial parasites in the Warburg manometer in which centrifugation was eliminated. When the blood of the infected animal contained a sufficient number of parasites, enough was withdrawn to allow of 1 cc. for each Warburg flask potassium oxalate (approximately 5 mgm. per 1 cc. of blood) being used as an anticoagulant. It is claimed that the method described has the advantage over that employed by the earlier observers in that there is less risk of damage to the parasites during the manipulations. It was found that the oxygen uptake of normal blood was considerably less than that of infected blood so much so that this could be ignored in estimating the quantity taken up by the parasites. It was also found that with increase in size of the parasites the oxygen absorbed increased. During the survival of the parasites glucose is used up and unless this is renewed the oxygen uptake declines. Mannose fructose and glycerol can be employed by the parasites in place of glucose. In addition to *Plasmodium knowlesi* which was most thoroughly investigated four other species viz *P. mous* and *P. cynomolgi* of monkeys and *P. cathemerium* and *P. lophurae* of birds were studied.

C M Wenyon

COGGESHALL (L. T.) & MAIER (John) **Determination of the Activity of Various Drugs against the Malaria Parasite.**—*Jl Infect Dis* 1941 Sept-Oct Vol. 69 No 2 pp 108-113.

In a previous paper [above] the authors have described their technique for measuring the respiration of malarial parasites. In the

YOUNG (Martin D.) The Oral Transmission of *Plasmodium relictum* in the Pigeon.—*Public Health Rep* 1941 July 11 Vol. 56 No 28. pp 1439-1440

SHORTT and MEXON have recently reported the oral transmission of *P. knowlesi* and *P. gallinaceum*. The present author has confirmed this work by infecting pigeons with *P. relictum* by the oral route, using blood obtained from infected birds by heart puncture. So far 10 pigeons have been given blood into the crop through a catheter attached to a syringe and of these seven became infected.

The malaria has been transferred through two consecutive passages by oral administration. This adds further evidence to that recently obtained on the exo-erythrocytic forms of malaria, indicating that these parasites may be able to live in types of tissue other than blood
C W

BELTRAN (Enrique) Estado actual de nuestros conocimientos acerca del *Plasmodium gallinaceum* Brumpt, 1935 [The Present State of Knowledge of *P. gallinaceum*].—*Rev Inst Salubridad y Enfermedades Trop Mexico* 1941 June. Vol. 2 No 1 pp. 95-113 [58 refs.] English summary

VERRIANI (Vakleamar) & GOMES (Brenno Furtado) Sobre um novo hematozoário da Galinha—*Plasmodium juxtannucleare* n. sp. (Nota prévia.) [A New Hematozoon of the Fowl, *Plasmodium juxtannucleare* n. sp.].—*Rev Brasileira Biol Rio de Janeiro* 1941 June Vol 1 No 2. pp 231-233. English summary (4 lines)

The authors announce their discovery in two domestic fowls in the State of Minas Geraes, Brazil, of a small malarial parasite resembling *P. vaughani*, *P. romi* and *P. nucleophilum*. The parasite has a tendency to be in contact with the nucleus of the host cell and is accordingly given the name *P. juxtannucleare*. It is readily inoculable to chickens, while one of two turkeys inoculated became infected. A number of other birds, including pigeons and canaries, appear to be refractory.

A fuller description of the parasite is promised in a further paper
C M W

COGGESHALL (L. T.) Infection of *Anopheles quadrimaculatus* with *Plasmodium cynomolgi* a Monkey Malaria Parasite, and with *Plasmodium lophurae* an Avian Malaria Parasite.—*Amer J. Trop Med* 1941 July Vol 21 No 4 pp. 525-530 With 1 fig

The monkey malarial parasite *Plasmodium cynomolgi* used in these experiments was discovered in a *Macacus cynomolgus* which had been acquired from an animal dealer in the United States. The monkey which had come from Java, was not suspected of having a malarial infection. It was accordingly inoculated with *P. knowlesi*. When the malarial infection developed this was found to be a mixed one of *P. knowlesi* and *P. cynomolgi*. The administration orally of three 1.0 gram doses of sulphaniilamide eradicated the *P. knowlesi* infection leaving the *P. cynomolgi* which was sub-inoculated into rhesus monkeys. In a previous experiment a pure infection of *P. knowlesi* had been obtained in a similar manner from a mixed infection with *P. knowlesi*. In rhesus

monkeys *P. cynomolgi* which closely resembles *P. vivax* produces a moderately severe infection followed by recovery from the acute attack. Parasites however remain in the blood for many months.

It was found that *Anopheles quadrimaculatus* the principal vector of human malaria in the United States may readily become infected when fed on monkeys harbouring *P. cynomolgi*. In a total of 250 mosquitoes dissected 30 per cent were infected. In some lots as many as 80 per cent of the mosquitoes were infected. The infections were in many cases heavy over 1 000 oöcysts being counted on a single stomach. Sporozoites appear in the salivary glands on about the fifteenth day. Such infected mosquitoes transmitted the infection to normal rhesus monkeys but failed to do so to general paralytics. Attempts were made to infect *A. quadrimaculatus*, *A. punctipennis* and *Culex pipiens* with *P. knowlesi* by feeding on infected monkeys and on general paralytics, but without any success. The mosquito *A. quadrimaculatus* was also infected with *Plasmodium lophurae* a parasite which had originally been isolated from a Borneo fire-backed pheasant by inoculation into chickens. The mosquitoes fed on infected chicks became infected to the extent of 46 per cent. The infections were however not heavy a maximum of 60 oöcysts being counted on one stomach. In this case salivary gland infections have not been observed. Development of this parasite in *Culex pipiens* and *Aedes aegypti* was also observed. Though *A. quadrimaculatus* was so heavily infected with *P. cynomolgi* attempts to infect it with *P. vivax* were not successful.

C. M. W.

TROPICAL OPHTHALMOLOGY

A REVIEW OF RECENT ARTICLES—XXXXX *

Conjunctiva.—BIDYADHAR¹ has reported from Sonpur State in India the occurrence of two cases of an acute follicular conjunctivitis which were of the type described by Béal. The onset of the inflammation was sudden with oedema of the lids (most marked in the lower lids) and intense vascular engorgement in the fornices accompanied by the development of follicles. The pre-auricular glands were enlarged but free from tenderness. The condition cleared up in a little more than two weeks under simple treatment. Inclusion bodies were absent and cultures from the conjunctiva proved negative. Moderate eosinophilia and lymphocytosis were present. Both patients had suffered from previous attacks of conjunctival inflammation.

Trachoma.—McKELVIE and KIRK² have recorded their experience of the use of sulphonamides in the treatment of trachoma in the Sudan.

* For the 38th of this series see Vol. 38 pp. 723-724

¹ BIDYADHAR (Nabin Kishore) Acute Follicular Conjunctivitis resembling Béal's Type. Report of Two Cases with a Short Review of the Literature. —*Arch. Ophthalm.* 1941 Oct. Vol. 26, No. 4 pp. 587-594. [30 refs.]

² McKELVIE (A. R.) KIRK (R.) & HOLDER (H. J.) Observations on the Chemotherapy of Trachoma. —*Amer. J. Ophthalm.* 1941 Sept. Vol. 24 No. 9 pp. 1035-1043. [45 refs.]

YOUNG (Martin D) The Oral Transmission of *Plasmodium relictum* in the Pigeon.—*Public Health Rep* 1941 July 11 Vol. 58. No. 23. pp 1439-1440

SHORTT and MEXON have recently reported the oral transmission of *P. knowlesi* and *P. gallinaceum*. The present author has confirmed this work by infecting pigeons with *P. relictum* by the oral route, using blood obtained from infected birds by heart puncture. So far 10 pigeons have been given blood into the crop through a catheter attached to a syringe, and of these seven became infected. "The malaria has been transferred through two consecutive passages by oral administration." "This adds further evidence to that recently obtained on the exo-erythrocytic forms of malaria, indicating that these parasites may be able to live in types of tissue other than blood."

C IV

BELTRAN (Enrique) Estado actual de nuestros conocimientos acerca del *Plasmodium gallinaceum* Brumpt, 1935 [The Present State of Knowledge of *P. gallinaceum*].—*Rev Inst Salubridad y Enfermedades Trop Mexico* 1941 June. Vol. 2. No 1 pp. 85-112. [33 refs] English summary

VERSIANI (Valdemar) & GOMES (Brenno Furtado) Sobre um novo hematozôo da Galinha.—*Plasmodium juxtannucleare* n. sp. (Nota prévia.) A New Hematozoon of the Fowl, *Plasmodium juxtannucleare* n. sp.,—*Rev Brasileira Biol.* Rio de Janeiro. 1941 June. Vol 1 No. 2 pp. 231-233. English summary (4 lines).

The author announce their discovery in two domestic fowls in the State of Minas Geraes, Brazil, of a small malarial parasite resembling *P. ranghoni*, *P. rossi* and *P. nucleophilum*. The parasite has a tendency to be in contact with the nucleus of the host cell and is accordingly given the name *P. juxtannucleare*. It is readily inoculable to chickens while one of two turkeys inoculated became infected. A number of other birds, including pigeons and canaries, appear to be refractory.

A fuller description of the parasite is promised in a further paper.

C M II

COGGESHALL (L. T) Infection of *Anopheles quadrimaculatus* with *Plasmodium cynomolgi* a Monkey Malaria Parasite, and with *Plasmodium lophurae* an Avian Malaria Parasite.—*Amer J. Trop Med* 1941 July Vol 21 No 4 pp 525-530 With 1 fig

The monkey malarial parasite *Plasmodium cynomolgi* used in these experiments was discovered in a *Macacus cynomolgus* which had been acquired from an animal dealer in the United States. The monkey which had come from Java, was not suspected of having a malarial infection. It was accordingly inoculated with *P. knowlesi*. When the malarial infection developed, this was found to be a mixed one of *P. knowlesi* and *P. cynomolgi*. The administration orally of three 1.0 gram doses of sulphamylamide eradicated the *P. knowlesi* infection, leaving the *P. cynomolgi* which was sub-inoculated into other monkeys. In a previous experiment a pure infection of *P. cynomolgi* had been obtained in a similar manner from a mixed infection with *P. knowlesi*. In rhesus

monkeys *P cynomolgi* which closely resembles *P vivax* produces a moderately severe infection followed by recovery from the acute attack. Parasites however remain in the blood for many months.

It was found that *Anopheles quadrimaculatus* the principal vector of human malaria in the United States may readily become infected when fed on monkeys harbouring *P cynomolgi*. In a total of 250 mosquitoes dissected 30 per cent. were infected. In some lots as many as 80 per cent. of the mosquitoes were infected. The infections were in many cases heavy over 1000 oöcysts being counted on a single stomach. Sporozoites appear in the salivary glands on about the fifteenth day. Such infected mosquitoes transmitted the infection to normal rhesus monkeys but failed to do so to general paralytics. Attempts were made to infect *A quadrimaculatus* *A punctipennis* and *Culex pipiens* with *P knowlesi* by feeding on infected monkeys and on general paralytics, but without any success. The mosquito *A quadrimaculatus* was also infected with *Plasmodium lophurae* a parasite which had originally been isolated from a Borneo fire-backed pheasant by inoculation into chickens. The mosquitoes fed on infected chicks became infected to the extent of 46 per cent. The infections were however not heavy a maximum of 60 oöcysts being counted on one stomach. In this case salivary gland infections have not been observed. Development of this parasite in *Culex pipiens* and *Aedes aegypti* was also observed. Though *A quadrimaculatus* was so heavily infected with *P cynomolgi* attempts to infect it with *P vivax* were not successful.

C M W

TROPICAL OPHTHALMOLOGY

A REVIEW OF RECENT ARTICLES—ΛΛΛΛ *

Conjunctiva—BIDYADHAR¹ has reported from Sonpur State in India the occurrence of two cases of an acute follicular conjunctivitis which were of the type described by Béal. The onset of the inflammation was sudden with oedema of the lids (most marked in the lower lids) and intense vascular engorgement in the fornices accompanied by the development of follicles. The pre-auricular glands were enlarged but free from tenderness. The condition cleared up in a little more than two weeks under simple treatment. Inclusion bodies were absent and cultures from the conjunctiva proved negative. Moderate eosinophilia and lymphocytosis were present. Both patients had suffered from previous attacks of conjunctival inflammation.

Trachoma—MCKELVIE and KIRK² have recorded their experience of the use of sulphonamides in the treatment of trachoma in the Sudan.

For the 33th of this series see Vol. 33 pp. 723-724

¹ BIDYADHAR (Nabin Kishore) Acute Follicular Conjunctivitis resembling Béal's Type. Report of Two Cases, with a Short Review of the Literature. —*Arch Ophthalm.* 1941 Oct. Vol. 28, No. 4 pp. 587-594 [30 refs.]

² MCKELVIE (A. R.) KIRK (R.) & HOLDER (H. J.) Observations on the Chemotherapy of Trachoma.—*Trans Jt Ophthalm.* 1941 Sept. Vol. 24 No. 9 pp. 1035-1043 [45 refs.]

is stated to be also due to a deficiency of vitamin B₂ and is characterized by a partial atrophy of the optic nerve which leads to a pallor of the temporal portion of the papilla. The area involved may vary from a little less than half up to three-quarters of the disc. The author remarks that vitamin A deficiency is unimportant in Trinidad and that keratomalacia is rare. Beriberi and pellagra are clinical curiosities there.

JOHNSON* in a paper on the ocular effects of vitamin-B-complex deficiency states that in the University Hospitals of Cleveland, Ohio the routine treatment of keratitis rosacea is a daily intravenous injection of 1 or 2 mgm. of riboflavin and the oral administration of three teaspoonfuls of elixir of vitamin B complex until the lesion shows signs of healing. Two injections usually suffice to cure mild cases but treatment may be required for a week in severe attacks, especially if there is a complete absence of HCl. He suggests that a deficiency of riboflavin must seriously impair oxidation in the cells of the cornea since in such an avascular structure the process is dependent upon the presence of Warburg's yellow enzyme. Proliferation of capillaries from the limbus would seem to be an attempt to relieve localized anoxaemia by bringing haemin substances to the spot.

The triennial report of the Madras Government Ophthalmic Hospital for the years 1938-1940 omits clinical remarks but records statistics which are valuable to those interested in the incidence of eye disease in the tropics.

The hospital has now reached a considerable size and contains beds for 170 in-patients. A slight fall occurred in the number of out-patients during the triennium—from 39,953 in 1938 to 35,868 in 1940—a rise however occurred in the number of in-patients in the same period from 5,103 to 5,842. Macular keratitis appears to have greatly declined and only 38 cases of the disease were treated in 1940. Trachoma accounted for 1,708 admissions in 1940. Koch-Weeks catarrh for 2,216 other forms of acute infection of the conjunctiva for 1,206 and diplo-bacillary inflammation for 1,355. 468 patients were admitted for keratomalacia and 621 for keratomalacia with xerosis of the conjunctiva during the triennium. Retinitis pigmentosa accounted for 234 out-patient admissions during the period, injury to the macula by the sun for 150 and ametropia for 15,154. astigmatism was the most common error of refraction. There were 682 cases of glaucoma and 3,036 of cataract treated as in-patients during 1940 and 9,517 operations were performed during that year, 2,377 being for cataract. The combined operation with capsulotomy for cataract, and sclero-corneal trephining for glaucoma, appear to have been the operations of choice for these conditions. In addition to the above, 618 operations were performed by the Honorary Medical Staff of the hospital.

H Kirkpatrick.

JOHNSON (L. V.) Clinical Ocular Conditions associated with Vitamin B Complex Deficiency—*Amer Jl Ophthalm* 1941 Nov Vol 24 No. 11 pp 1233-1240 With 8 figs. (2 coloured on 1 plate)

VENOMS AND ANTIVENENES

ROSENFELD (Samuel) & RUBINSTEIN (Joshua) Separation of the Coagulant from the Toxic Principles of the Venom of the Australian Tiger Snake (*Nolechis scutatus*) With Remarks on the Mode of Action of the Coagulant.—*Jl Lab & Clin Med* 1941 Oct Vol. 27 No 1 pp 45-49 With 1 fig [10 refs.]

The venom of *N. scutatus* is one of the most powerful snake poisons known and is toxic by virtue of the neurotoxin it contains but it also contains a powerful coagulant substance comparable with that of the S American vipers *Bothrops jararaca* and *B. atrox* and of the Australian black snake *Pseudechis porphyriaceus*. This coagulant property has been used to arrest severe capillary haemorrhage by local application. The authors have found that the addition of 5 per cent. HCl to an equal volume of 1 in 1000 solution of the venom in physiological saline leads to the formation of a precipitate which contains the whole of the coagulant principle leaving the toxin in solution. The precipitate is soluble in distilled water and three precipitations are necessary for complete separation.

The coagulant factor is harmless on injection into mice even in an amount equivalent to that contained in 3000 minimal lethal doses of the original venom the toxic factor has no coagulating action. The coagulant factor behaves like thrombokinas plus calcium readily converting prothrombin to thrombin.

GHOSH (B N) DE (S S) & CHAUDHURI (D K.) Separation of the Neurotoxin from the Crude Cobra Venom and Study of the Action of a Number of Reducing Agents on it.—*Indian Jl Med Res* 1941 Apr Vol 29 No 2 pp 367-373

1 A very active sample of neurotoxin has been separated from the crude cobra (*Naja tripudians*) venom by fractional precipitation of impurities with sodium sulphite adsorption of the neurotoxin on tungstic acid followed by its elution and further fractional precipitation from the eluted solution by treatment with ammonium sulphate. The pigeon and mouse units of this neurotoxin were 0.0061 mg and 0.022 respectively.

2 The action of a number of reducing agents on solutions of cobra neurotoxin has been tried *in vitro* and it has been found that sodium bisulphate zinc and hydrochloric acid (N/10) ascorbic acid and cysteine can destroy the neurotoxin to a marked extent.

ARANTES (J B) & NEIVA (Cicero) I Toxicidade do veneno crotálico para o cobrao a. Via subcutânea. b Via intra-muscular [Toxicity of the Venom of *Crotalus terrificus* by the Subcutaneous and Intramuscular Routes].—*Brasil Medico* 1941 Jul 5 & 12. Vol 55 Nos. 27 & 28 pp 465-466 477-478 English summary (7 lines)

The authors have found by experiment that the minimum lethal doses for guineapigs weighing 330 to 380 gm. are—subcutaneously 0.025 mgm. intramuscularly 0.013 mgm.

C IV

NEIVA (Cicero) & ARANTES (J. B.) III Anagotomia para o veneno crotálico em águas da prata. [Antagonism of Prata Mineral Water to the Venom of *C. terrificus*].—*Brasil-Médico* 1941 Aug 30 Vol. 55 No. 35 pp. 598-599

In experiments on guinea pigs weighing 330 to 380 gm. the minimum lethal dose of the rattlesnake poison was ascertained by intramuscular injections of 0.013 mgr and subcutaneous injections of 0.025 mgr. A measured quantity of mineral water was added to the doses of poison to make a solution that was injected into guinea pigs. The experiments carried out show that when mineral water and poison of *Crotalus terrificus* are brought together there is an antagonistic effect of the water to the poisonous substance. It signifies a counteraction of mineral water to venom in which the former may almost exactly neutralize or weaken the action of the latter.

"This paper deals with the antitoxic effect of Prata mineral water on venom of *C. terrificus* in laboratory experiments and duplication of these researches near the mineral water springs. The action of the Prata bottled mineral water neutralizes 0.018 mgr of crotalic poison when injected intramuscularly. In the locale of the springs superior results were obtained by the same methods. [See also this *Bulletin* 1941 Vol. 38, p. 682.]

NEIVA (Cicero) & ARANTES (J. B.) IV Anagotomia para o veneno crotálico em águas de Caxambô. [Antagonism between Caxambô Waters and Crotaline Venom].—*Brasil-Médico* 1941 Sept 6 Vol. 55 No. 36 pp. 609-610 English summary

Experiments on guinea pigs of the antitoxicity of Caxambô mineral water to *Crotalus terrificus* poison employing subcutaneous and intramuscular injections are described. Formerly the minimum lethal dose to guinea pigs weighing 330 to 380 gm was ascertained. When injected by intramuscular route it was found that water rich in magnesium salts revealed greater antitoxicity than that of alkaline water. Subcutaneously the former type was negative in action but the latter produced the inactivation of the poison studied.

NEIVA (Cicero) & ARANTES (J. B.) V Anagotomia para o veneno crotálico em águas de São Lourenço. [Antagonism between São Lourenço Waters and Crotaline Venom].—*Brasil-Médico* 1941 Sept. 13 Vol. 55 No. 37 pp. 632-633 English summary

"Guinea pigs were protected against rattlesnake poison by injections of mineral water from S. Lourenço. The experiments were carried out in such a way that there was no loss among the guinea pigs which were injected with varying amounts of crotalic poison plus mineral water. There is an antagonistic action between mineral waters and rattlesnake poison so that if guinea pigs are injected subcutaneously with a dilution of an m.l.d. of venom of *Crotalus terrificus* in S. Lourenço waters no death is observed. These results conform with others observed in similar experiments in which the venom-mineral water solution was introduced intramuscularly.

SUBEDAR (S A) Snake Venom in Therapeutics—*Med Digest* 1941
Oct Vol. 9 No 10 pp 282-287

A general account in which reference is made to the use of cobra venom in epilepsy and cancer and of viper venom as a haemostatic.
C IV

PASRICHA (C L) & ABEDIN (Z) The Sterility of Snake Venom Solutions.—*Indian Med Gaz* 1941 May Vol. 76 No 5 pp
276-277

The authors examined 25 snake venom solutions used for haemostatic or analgesic purposes, for the presence of aerobic and anaerobic bacteria. Of 11 cobra venoms 2 and of 14 viper venoms 6 were contaminated. The reason for the examinations was the occurrence of a severe reaction after subcutaneous injection of one of the solutions.

Crude venom is grossly contaminated when collected the most satisfactory method of sterilization is filtration through an asbestos filter
C IV

GITHENS (Thomas S) The Polyvalency of Crotalidic Antivenins
IV Antinecrotic, Anticoagulant and Antiproteolytic Actions—
Jl Immunology 1941 Oct Vol. 42. No 2. pp 149-159
With 1 plate

Death from snake venom is commonly due to the action of neurotoxin and antivenenes are standardized by their ability to neutralize these but little or no attention appears to have been given to the antigenic relationship of the other constituents of the venoms. The author has therefore studied the local necrotic factor the blood-clotting factor and the proteolytic factor determining quantitatively their effective doses and the ability of antivenenes to neutralize them. In this study the venoms of 26 species of pit vipers two of true vipers and one of an elapine snake were used, and three antivenenes polyvalent Crotalidic Cascabel (monovalent against *C d durissus*) and Bothropic (monovalent against *B atrox*)

The content of necrotic factor of the pit vipers is more constant than that of the neurotoxin and nearctic Crotalidic and Cascabel antivenenes are equally able to neutralize the necrotic factors of various venoms. The content of the blood-clotting factor of different lots of venoms varies very widely even within the same species and bears no relation to the other factors. Antivenenes are able to neutralize the clotting factor but are less effective than against the neurotoxic and necrotic factors. Different lots of venom of the same species agree in their proteolytic activity but the various species of pit vipers show great differences. Antivenenes are irregular and uncertain in their neutralizing action and show no evidence of specificity.

Full protocols are given of the experiments on which these conclusions are based.
C IV

GRASSET (E) On the Standardisation of African Viper ("*Bitis arietans*") and Cape Cobra ("*Naja flava*") Antivenenes.—*Bull Health Organisation* (League of Nations.) 1940/41 Vol. 9 No 4 pp 476-491 With 4 graphs.

The following conclusions can be deduced from the experiments undertaken with a view to determining whether the method of Banic

and Lybetic as modified by Ipsen and proposed by the Permanent Commission on Biological Standardisation for the assay of European viper antiserum could be applied to the standardisation of African viper and Cape cobra antivenenes

1 By means of this method of assay at various levels, it is possible to titrate with satisfactory accuracy the neutralising power of the monovalent African viper (*Bitis ardens*) antiserum and to assess the amount of *Bitis* antibody contained in the polyvalent viper-cobra antivenene

"2. The method can also be applied with satisfactory accuracy to the titration of the monovalent *Naja ferox* antiserum and of the amount of *Naja* antibody contained in the polyvalent viper-cobra antivenene

"3. Thus it is possible by means of this method, to assess the amount of African viper and Cape cobra antibodies contained in the polyvalent antivenene prepared by the South African Institute for Medical Research"

BOKMA (H.) Nog eens een beet van een zeeslang. (Bite by a Sea Snake.)—*Geneesk. Tijdschr. v. Nederl. Indië* 1942. Jan 19. Vol. 82. No. 2. p. 87

The patient, a strongly built Javanese male stated that at 6 a.m. on October 6th, 1941 when he was fishing in shallow water he kicked a snake which bit him on the left foot. When seen two hours later he complained of a "feeling of paralysis" over his whole body. On the dorsum of the left foot, over the outer metatarsals was a wound, 1 cm. in length. No other symptoms were present. reflexes were normal. pupils reacted to light and convergence. urine not obtainable. He was given 100 cc of antivenene intravenously. The next day he passed 400 cc of urine coffee-coloured. He complained now of stiffness of the legs, and he could sit only with difficulty and the legs were spastic on passive movement. knee-jerks and Achilles reflex not elicited. Cremasteric and abdominal reflexes present. no pain on passive movement. Urine was light brown, amphoteric in reaction, sp. gr 1023. marked reaction for albumen, no biliary pigments or erythrocytes. General condition good. Next day legs less spastic, reflexes present, albuminuria less, was able to walk, but leg movements were still stiff. Twenty-four hours later (October 9th) he was well, urine clear and free from albumen. At no time was there any swelling of the parotids or sweating, nor was there any circulatory or respiratory disturbance.

H H S

BOKMA (H.) Dodelijke vergiftiging door den beet van een zeeslang *Enhydryna schistosus* (Daudin). (Fatal Poisoning from the Bite of the Sea Snake *E. schistosus*.)—*Geneesk. Tijdschr. v. Nederl. Indië* 1941. Sept. 9. Vol. 81. No. 38. pp. 1926-1931. English summary.

"Description of a case of sea-snake poisoning (*Enhydryna schistosus* (Daudin)). The symptoms were marked muscular paralysis, accentuated swelling of the parotis gland, pain and difficulty in swallowing, difficulty of speech, hemoglobinuria (there was no hemolysis). Hyperhydrosis.

The patient died 24 hours after the snake-bite the pulse becoming thread-like, the respiration becoming slower and weaker

Post mortem Hyperemia of the lungs and enormous ectasia of the stomach and the intestines.

Mikroskopically Necrotic skin lesion surrounded by inflammation at the site of the bite Hyperemia of the internal organs

DE MAGALHÃES (Octavio) & GUIMARÃES (Rubens) Algumas observações sobre acidentes pela picada dos escorpiões (*T. serrulatus*) [Observations on the Results of the Sting of the Scorpion *Tityus serrulatus*].—*Brasil Medico* 1941 July 5 Vol. 55 No 27 pp 461-465 With 3 figs.

Three cases are reported. The first is of a young man stung at the age of five The history given is of immediate and persistent vomiting first of food later of bile and blood with dyspnoea and in a few hours paresis of the right arm and leg No serum was available for treatment At the time of examination 17 years later the right arm was wasted, the hand in a position of extension and of *main en griffe* The right hip and knee joints were somewhat flexed the foot being rotated outwardly There was spasticity of the muscles of the right arm and contracture of the tendo Achillis with positive Babinski clonus and exaggerated tendon reflexes. The left side was normal. [The period between the infliction of the sting and the examination by the authors was long but the authors appear to be in no doubt that the paresis was due to the sting]

The second case was that of a child stung on the left foot Vomiting dyspnoea, micturasis bradycardia suffusion of the conjunctivae and excessive bronchial secretion followed. Anti-scorpion serum was given 5 cc into the cisterna magna and 30 cc intravenously this was followed by urticaria and sweating treated with adrenalin. More serum was given and the child's condition improved but at the site of the sting there was intense oedema with formation of an abscess which burst spontaneously The third patient a man of 23 was bitten on the hand and treated with serum the general condition remained good but the whole hand was swollen The patient recovered

C II

HARGREAVES (W. H.) & MACKENZIE (L. G. F.) Spider Bite simulating Acute Abdomen.—*Jl Roy Army Med Corps* 1942. Jan Vol. 78 No 1 pp 37-39 With 1 fig

A Polish soldier in Palestine was brought to hospital with what was thought to be an acute abdominal condition, diagnosed tentatively as acute appendicitis. He was slightly cyanosed, shocked, with shivering profuse sweating temperature 97°F pulse 88 and weak and complaining of intense pain in the abdomen. He had vomited on the way to hospital and the abdomen was rigid, tense and board like and very tender. Another diagnosis suggested was perforated peptic ulcer. The patient had been quite well till two hours before admission when he felt a sharp pain in the right gluteal region where he was bitten by a spider which proved to be a female *Latrodectus lugubris*. The pain like cramp spread over the whole body within a minute and vomiting soon followed.

He was given morphia and intravenously 10 cc. of 10 per cent calcium gluconate. He was very ill for three days and the abdominal pain and tenderness persisted. Blood concentration was marked

red corpuscles 8,920,000 per cmm haemoglobin 120 but white cells 10,400 and differential count normal. Two species of *Latrodictus* are found in Palestine, the black *L. lugubris* and the black with red spots, *L. trochocinctatus*. The venom is said to be a toxalbumen some 15 times as potent as that of the prairie rattlesnake *Crotalus tibicaris*.

[The results of bites by *L. mactans* and other species have been repeatedly described in this *Bulletin* see 1935 Vol. 32, pp. 673-914 1935-1936 Vol. 33, pp. 401-402, where an account is given of symptoms like those above following an experimentally infected bite. 1939 Vol. 36, pp. 570-571 567-568. 1940 Vol. 37, pp. 516-517.]

H H S

MISCELLANEOUS.

DYER (Brian R.) Studies of Ground Water Pollution in an Alkaline Alluvium Soil.—*Indian J. Med. Res.* 1941 Oct Vol. 29 No. 4, pp. 867-889. With 5 figs & 1 plate. [Summary appears also in *Bulletin of Hygiene*.]

During the past ten years many bored latrines have been installed in the East. There is a possibility that contamination of shallow wells may occur when the latrine extends down into the soil water. An investigation was carried out by the Punjab Public Health Department to determine to what extent is the spread of pollution introduced into subsoil water.

A bore hole was sunk to sub-soil water level in an area free from any known source of pollution. At measured distances from this bore-hole hand pumps were introduced tapping the sub-soil water after carrying out bacteriological, chemical and physical tests to assess the normal quality of the sub-soil water. Night-soil from a small community of persons was introduced into the borehole daily.

The findings reported in the paper apply only to the upper soil or crust which has a high alkalinity and contains a high percentage of sodium sulphate.

Pollution as determined by the "Eijkman method" (positive being acid and gas in MacConkey broth incubated at 45°C. in sample of 10 ml. or less) passed the 5-foot zone but did not reach the 10-foot zone.

Pollution as shown by the "MacConkey method" (positive being acid and gas in MacConkey broth incubated at 37°C. in sample of 50 ml. or less) passed the 15-foot zone but did not reach the 20-foot zone.

C. welchii was not encountered at any time during the experiment. 40 ml. of water tested by method of Wilson and Blair).

At no time was there any variation in pH which could be related to pollution. There was no odour nor foaming of samples from hand-pumps. Dissolved oxygen determinations correlated well with the bacteriological findings.

The author gives a detailed description of the layout of the experiment with a diary of procedure, and the results are illustrated in graphical and tabular form.

E Winkle Taylor

STRANSKY (Eugene) & PECACHE (Leon V) Noma in the Philippines.
—*Jl Philippine Med Assoc* 1941 Oct Vol. 21 No 10 pp.
501-507 [11 refs.]

Noma is not rare in the Philippines and the authors present records of 42 cases. The usual aetiological factors are stated to be ileocolitis measles and tuberculosis none was due to malaria but one was associated with acute lymphatic leucaemia. Two of the patients were aged 6 one aged 9 and two aged over 50 the remainder were under 5 years. Of the 42 five recovered, 14 died in hospital and 23 were taken home against advice and probably died. The post mortem findings of the 14 are given: septicopyaemic conditions were found in seven ileocolitis in seven, bronchopneumonia in five and tuberculous foci in three. The septicopyaemic processes are like noma itself secondary conditions due to lack of resistance of the body brought about by ileocolitis measles and other infections. There were three cases of manifest vitamin A deficiency.

The patients are febrile if the causative condition is a febrile disease and the blood picture retains the characters of the predisposing illness there is a remarkable lack of pain. Treatment depends on the aetiology in septicopyaemic conditions sulphonamides may be of use. Prophylaxis is more important and in this improvement in the standard of nutrition and the further development of child welfare play their part.

C IV

TRATMAN (E. K.) A Note on the Treatment of Cancrum Oris.—*Jl Malaya Branch Brit Med Assoc* 1941 June Vol 5 No 1 pp 31-33 With 3 figs.

The author has treated 11 cases by the method now advocated with six cures but two of the patients died before the treatment had time to make an impression. General treatment entails the administration of one of the sulphonamide preparations, by the mouth or preferably by injection in maximum doses continued for several days but it is essential that a blood examination should first be carried out to exclude agranulocytosis which may simulate some of the symptoms of cancrum oris. The author has used soluseptasine chiefly. Local treatment consists of swabbing with eusol and wiping away the sloughs and the immediate application of a fresh 5 per cent. solution of gentian violet. It is important to make sure that this solution actually comes into contact with the tissues, and is not held off by a layer of saliva or mucin. The gentian violet should be held in contact for not less than 30 seconds and this local treatment is repeated every four hours except during sleep. Teeth and bone sequestra should only be removed when thoroughly loose. The patients should be given a liberal diet with plenty of vitamin C. Isolation of the patient should be practised and gloves and masks should be worn by the attendants.

C IV

McMILLEN (SIR I) Successful Treatment of Noma with Solution of Formaldehyde. Report of Six Additional Cases.—*Amer Jl Dis Children* 1941 Sept Vol. 62 No 3 pp 590-595 With 1 fig.

Records are given of six consecutive cases in native children in Sierra Leone all were treated with formaldehyde (B.P.) and all

recovered, whereas earlier experience with other methods of treatment had indicated a case mortality rate of about 80 per cent. The method is as follows—no attempt is made to excise all infected tissue, but hanging shreds and loose teeth may be removed the ulcer is carefully dried with cotton, and the formaldehyde applied to the ulcer from a cotton swab well saturated but not dripping. This application is made daily until there is no sign of further extension. Four or five applications are usually necessary. Care should be taken that the solution does not run back into the pharynx and that the formalin gas is not inhaled. This may be prevented by plugging the throat or the nostrils with cotton wool.

The treatment appears to be highly efficacious even in advanced cases. In some instances sulphonamide drugs were also given but did not appear to have any curative effect and in those cases in which they were not given the formaldehyde was just as effective as in the others. It was noticed that the smell of formaldehyde could be detected 24 hours after application and if the action of the gas liberated is important, it is considered that the retention of spongy necrotic tissue may be a help rather than a hindrance in that it tends to hold much more of the solution and to give off the gas for a much longer time than healthy tissue.

C II

VELUPILLAI (M) A Preliminary Note on the Treatment of Ulcers with Shark Liver Oil.—*Jl Malaya Branch Brit. Med Assoc.* 1941 June Vol 5 No 1 pp 34-40

Fifteen cases were treated some of the ulcers had existed for years, others for a few months. All the patients were free from leprosy, syphilis and diabetes and all had been treated by other methods without success. Treatment consisted in mopping out the ulcer and smearing on shark liver oil, covering with oil-impregnated gauze or lint, cotton wool and bandages. These dressings were changed twice each week. If the ulcer was very foul it was cleaned with a mixture of pure Dettol, $\frac{1}{2}$ ounce and shark oil 3 ounces. The Dettol is soluble in the oil and has effective deodorant properties, and this mixture can be used in place of the shark oil for a week or two until the ulcer is clean after which shark oil alone is used.

Under this treatment granulation became active and there was rapid proliferation of epithelial tissue even in callous and stationary ulcers. All except one of the ulcers were healed, the average period of treatment being 46 days. The author states that the vitamin A content of shark oil is from 4,000 to 22,000 I U per gm. compared with the 800 I U of cod liver oil and it is to vitamin A that the healing of these ulcers is attributed.

C IV

LACZS (Waldemar) Tratamento da ulcera tropical epidemica. [The Treatment of Epidemic Tropical Ulcer]—*Brasil-Médico* 1941 Aug 23 Vol 55 No 34 pp 582-583

The author gives details of eight cases of tropical ulcer treated successfully by the application of sulphonamide preparations locally combined with other sulphonamides taken by the mouth. He emphasizes that it is the combination of the two methods which is chiefly responsible for the favourable action. Sulphanilamide was the preparation chiefly used.

C IV

- Riou (M) Ulcère du cou de pied d'étiologie mixte chancrillo-syphilitique (Phagédénisme mixte tertiaire de Milan.) [Ulcer of the Ankle of Mixed Aetiology]—*Rev Méd Française d'Extrême Orient* 1941 Mar-Apr Nos 3-4 pp 275-279 With 2 figs. on 1 plate.

The patient a Corsican in Hanou contracted a mixed chancre of the penis. The bacillus of Ducrey was found and his serum was positive for syphilis. One month after the onset and before healing was complete an ulcer formed over the left internal malleolus which proved to be very resistant to treatment with arsenic mercury bismuth Dmelcos vaccine sulphonamides X ray and ultra violet light. In this ulcer bacilli morphologically identical with Ducrey's bacillus were constantly found, along with staphylococci streptococci and Proteus. Anti-syphilitic treatment was pressed and the ulcer finally healed after a course of sulphapyridine. The author considers that the staphylococci and streptococci were not merely acting as saprophytes anti-syphilitic treatment and Dmelcos alone were incapable of producing cure.

- MOWAT (A H) & HENNESSEY (R S F) Rhinosporidiosis in a Native of Uganda.—*East African Med J* 1941 July Vol 18 No 4 pp 118-120

This is believed to be the first case of Rhinosporidiosis in a native of East Africa at any rate no previous record has been found. The patient was a Muganda peasant 50 years of age with obstruction of the left nostril due to a reddish pedunculated tumour the nasal sinuses showed thickened mucosa. At operation for its removal the growth was found to be attached to the floor of the inferior meatus at the front extremity of the inferior turbinate. Two months later a small recurrent nodule was appearing at the original site.

The tumour removed was rounded 14 mm. x 8 mm with a flat base of a papillomatous appearance with fibromatous centre and covered by stratified squamous epithelium with branched processes and in the interior cyst like structures ranging from 12 μ to 300 μ the larger having thick walls with large numbers of small nucleated bodies 6 μ or thereabouts in diameter morphologically indistinguishable from *Rhinosporidium seberi*. In the stroma of the tumour was infiltration with lymphocytes macrophages and plasma cells some polymorphonuclears and eosinophils.

- DHAYAGUDE (R. G) Unusual Rhinosporidial Infection in Man.—*Indian Med Gaz.* 1941 Sept. Vol 76 No 9 pp 513-515 With 6 figs on 1 plate

During the decade 1931-1940 the author has had 45 cases of rhinosporidiosis under his observation in Bombay. He records two as being of particular interest. The first was a Mohammedan male of 45 years with a pedunculated polypoid growth protruding from the urethra on micturition. It was found on examination to be about 2.5 cm. in length with a smaller one by its side and situated 3 cm. within the external meatus. Histological examination revealed the typical features of a rhinosporidial papilloma. There was no growth in the nose or nasopharynx.

The second patient was a Hindu male of 40 years with swellings scattered all over the body—he gave a six months' history stating that the first swelling appeared on the left leg and they then became generally distributed, as small firm nodules some of which broke down, suppurated and ulcerated—their size varied from 1 cm. to 10×5 cm. There was no nasal or nasopharyngeal growth. Attempts at cultivation on various media, aerobically and anaerobically were without success. The widespread character of the lesions disproved contact or lymphatic spread—in fact the only explanation seems to be extension by blood stream. The illustrations show the conditions clearly and two photographs depict the histological changes H H S

CARDI (A) Sobre um parasito semelhante ao "Rhinosporidium," encontrado em quistos da pele de uma Hyla (A Rhinosporidium-like Parasite of a Hyla (Tree Frog) — *Anstros do Inst. Biol* São Paulo 1940 Vol 11 pp 93-98 With 3 figs. on 2 plates.

The author found cystic enlargements in the skin of a tree-frog closely resembling *Rhinosporidium*. He places it he says in the same group but considering the distance in the zoological scale between the animal host of this (the Hyla) and *rhinosporidium* of man (*R. seeberi*) or horse (*R. equi*) he proposes to place it in a separate genus which he calls *Dermosporidium* and this species *D. hylarum* [not a very valid reason for the creation of a new genus] H H S

DE SILVA (Stanley) "Pseudo-Typhoid," a Ten Day Fever which is commonly mistaken for Typhoid Fever — *JL Ceylon Branch Brit Med Assoc* 1941 Sept Vol 38 No. 3 pp. 319-323 With 1 chart [Summary appears also in *Bulletin of Hygiene*.]

The author reports on ten cases of fever lasting for 10 days. The disease has the following characteristics: Young adults are the commonest victims, the fever (102°-103.5°F) is of sudden onset without chill or rigor, headache frontal and severe on the second to fifth days, face flushed, slight hebetude, tongue coated and dry, spleen palpable in some only, pulse on the slow side [rate not stated] no rash, temperature in evening 102°-103° for 4-5 days, then lysis to normal in 5 more no complications or sequelae.

Laboratory findings were not helpful. Haemoculture in five gave no growth of any of the enteric group, agglutination of the same was negative [the author does not state at what stages during, or intervals after the illness this was tried]. Weil-Felix negative in two cases, no leucopenia but relative and absolute lymphocytosis (40 per cent of 8,200) stool culture "proved negative in 4 cases," presumably for members of the enteric group.

To label a febrile disease P.T.O. pyrexia of uncertain (not "unknown") origin is to say the least, unsatisfactory for in most cases when the temperature falls and the patient recovers it is rare for further attempts to be made to solve the problem. To call it "pseudo-typhoid" is misleading for as described this disease has clinically few or none of the character of typhoid fever—there are no prodromata, the onset is sudden, the duration is brief, the fever chart not at all like that of typhoid, toxæmia is slight, complications and sequelae absent, headache short lived, abdominal symptoms lacking, no rash, no leucopenia.

[Clinically the symptoms would suggest one of the dengue-sandfly fever group or a mild form of infectious jaundice (Weil's disease). More laboratory investigations are called for such as attempts at culture of the virus on chorio-allantoic membrane for this may succeed 3-4 weeks after the onset of the fever inoculation of the blood into monkeys and mice and the mouse-protection test agglutination of *Leptospira* urine tests and so on all these should be possible at a place like the General Hospital Colombo]

H H S

SOROL (Rafael V) *Epidemia de hepatitis en Tucumán* [Outbreak of Hepatitis in Tucumán.]—*Semana Méd* 1941 July 17 Vol 48 No 29 pp 151-154 [Summary appears also in *Bulletin of Hygiene*]

In the latter half of 1939 and the first 4-5 months of 1940 there was an outbreak of hepatitis and jaundice in Tucumán. Notifications totalled 795 of which 550 were of men 176 of women and 69 of children. The onset was febrile with gastro-intestinal disturbance nausea vomiting diarrhoea. All ages were attacked from less than one year to 65 years. In some the initial symptoms were influenzal in character with malaise and general lassitude in others again the first noted sign was an unexpected jaundice with high-coloured urine. Some had constipation others diarrhoea with pale pasty stools. A few had bradycardia. The liver was enlarged palpable one or two fingers breadth below the costal margin and tender. The temperature was not high 38°C in the early days and some had no fever. In those with fever the temperature fell by lysis. Treatment was on general lines light diet sulphate of magnesium for the constipated. There were no fatalities. The cause is at present unknown but it is infectious hepatotropic and of benign evolution distinct from catarrhal jaundice.

H H S

RAO (P Krishna) *Infantile Cirrhosis of the Liver*—Reprinted from *Proc Indian Acad Sci* 1941 Vol 14 No 3 Sec B pp 310-338 With 15 figs. on 6 plates [52 refs]

In view of the appalling mortality among children claimed by this disease knowledge of its aetiology and pathology seems to be singularly defective.

The author has been investigating infantile cirrhosis since 1932 and has studied a series of 105 cases in the State of Mysore. It has now been confirmed that this condition is found to a greater extent among children in vegetarian families and to a less extent in non vegetarians but not in Moslems or Europeans.

It is peculiar to children between the ages of six and 24 months. The onset is insidious and accompanied by constipation but in the course of one to two months the liver is enlarged to the iliac crest and on palpation is smooth and hard. The spleen in some cases is also enlarged, extending to two fingers breadth below the costal margin. About five months from the onset ascites oedema of the face hands feet and eyelids become noticeable and in the terminal stages after a course of eight to ten months gastro-intestinal haemorrhages cholaemia and icterus ensue.

The leucocyte count varies from 8 000 to 14 000 per cmm in the early stages and may be as high as 50 000 in the terminal stages.

increase is mainly due to lymphocytes (35-70 per cent.) with corresponding decrease in the polymorphs (25-50 per cent.) and the Arneth count shows a definite shift to the left. Among the red blood corpuscles microcytes predominate but on the whole anaemia is not a feature.

At first negative, in jaundiced cases the van den Bergh reaction becomes biphasic the blood Wassermann is invariably negative, and on the whole the blood sugar is low. All routine tests and cultures of blood and faeces proved negative but in the urine of four *Bact. coli* was obtained and in one *Bact. alkaligenes*. The ascitic fluid was free from inflammatory cells. In one case where post mortem examination was conducted half an hour after death *Bact. coli communis* was isolated from the liver substance.



Advanced case of cirrhosis of the liver with ascites and oedema of hands and feet but no jaundice

[Reproduced from the *Proceedings of the Indian Academy of Sciences*

Pathological studies were limited to four specimens of livers, owing to religious restrictions. [The section which represents good pathological research is illustrated by excellent photomicrographs.] Identical appearances were present in all specimens, which exhibited multilobular fibrosis with areas of necrosis and zones of regeneration (adenomata). The conclusion is that the clinical features combined with histological changes fulfil the criteria of portal or Laennec's cirrhosis, so that it is suggested that the nomenclature should henceforth be "Infantile cirrhosis" instead of "Infantile biliary cirrhosis." In order to verify

whether the presence of bacteria in the liver might be due to post mortem invasion control cultures were made from 20 other cadavers but in no single instance was *Bact coli* obtained.

The author finds that the disease is met with in rich as well as poor—males and females being equally susceptible

All were nourished on cows milk from birth but no single instance occurred in breast fed infants

Substitution of modern patent infant milk foods for cows milk has prevented its occurrence in infantile cirrhosis families

Repeated pregnancies on the part of the mother do not form a predisposing fact nor does bacillary dysentery play any rôle. The two important aetiological factors are cows milk and invasion of the liver by *Bact coli*

[In a critical example quoted of twins—male and female—the latter fed on cows milk developed cirrhosis the former breast fed escaped]

Philip Manson Bahr

TER HEEGE (F H.) *Tropische hooikoorts* [Hay Fever in the Tropics.] —*Geneesk Tijdschr v Nederl Indië* 1941 June 10 Vol 81 No 23 pp 1231-1245 English summary

This article tries to give a short description of the history and of some causes of hay fever in the tropical parts of the Kingdom of Holland more especially Java.

The symptomatology the combination with multiple allergy and the therapy have also been described. Referred are 8 cases in which cutis reactions were made with *Zea mays* *Sorghum* *andropogon* coffee (*Robusta*) and (or) tobacco pollens or their extracts Two of these cases showed a seasonal rhinitis coming back every year especially or principally during the dry period. In these cases only pollen reactions were made The other patients showed a perennial rhinitis, for that reason they gave skin tests not only with pollens but also with other inhalation and food allergens In every case positive skin tests for one or more pollen were found. The patients suffering from perennial rhinitis six cases showed a multiple allergy

This means that hay fever in the tropics is very often non-seasonal not only on account of the irregularity of the pollination periods but also on account of a multiple allergy directed against various antigens.

The skin tests for other than pollen allergens are therefore more important in tropical than in non tropical hay fever

As for the treatment of hay fever it may be supposed that seasonal as well as non-seasonal vaccination will have to be used the method of one's choice depending on the individual history of the patient

WILLIAMS (A W) *The Blood Pressure of Africans.*—*East African Med J* 1941 July Vol 18. No 4 pp 109-117 [11 refs.]

Essential hypertension is rare among African natives in Africa, but in the negroes of North America is as common as in the whites Although there is a tendency to regard this difference as due to changes in mode of life and especially in diet it may be that change of climate is more important while altitude and physique are apparently correlated

The author has taken blood pressure readings of 458 male and female natives of Uganda aged 16-50 and of 72 males over 50 All were

those obtained by the use of mercuric chloride. Water maceration cannot be relied upon to furnish accurate data for the hydrocyanic acid content of cyanogenetic plants.

BROWNE (G. St. J. Orde) *Labour Conditions in West Africa*. Cmd. 6277
—148 pp 1941 London H.M.S.O. [2s 6d]

TROPICAL DISEASES
BULLETIN

Vol. 39]

1942

[No. 7

SUMMARY OF RECENT ABSTRACTS *
VI. PLAGUE*Epidemiology*

Much of the literature on plague reviewed in 1941 comes from the countries of South America where a large amount of work on human and rodent plague has been carried out. MOLL and O'LEARY (p. 321) give an account of the history of the disease in the various States showing that whereas in Colombia the Guianas Central America the Dominican Republic Haiti and certain smaller islands plague has not been reported and whereas in Cuba Mexico Porto Rico Panama and Uruguay it has proved easy to eradicate the disease in other parts of the Americas plague has become established in the country districts and presents a potentially grave danger. In Argentina thus sylvatic plague associated with the *cuis* (wild guinea pigs) and after epizootics these animals have entirely disappeared from some areas yet human infection is rare. In Bolivia man is believed to have played a principal part in transmission through the practice of holding wakes over the dead with a final partition among the visitors of the blankets and clothing of the deceased.

The same authors (p. 625) state that in Chile plague has been restricted almost entirely to ports the climate south of Valparaiso seems to be unfavourable to *Xenopsylla cheopis* as does that of the desert areas surrounding the northern ports.

BARRETO (p. 322) refers to two foci in north-east Brazil. The first is almost entirely rural and the incidence increases in the harvest season it is influenced by conditions of temperature and humidity and is associated with a predominance of *Rattus rattus* in the rural areas. The second is in the city of São Paulo where human cases occur every year. In north-east Brazil MACCHIAVELLO (p. 624) failed to find evidence of plague in the wild rodents and concludes that at present the disease is epizootic only in rats especially *R. rattus*. Human plague occurs especially after the onset of the rainy season because at that time of lower temperature the plague fleas *X. cheopis* are able to leave the shelter of the rat nests which they seek during the

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed (1941).

hot dry season. In São Paulo JUNIOR (p. 323) reports that the various rat and flea indices were found to be most helpful—a 2 per cent. rat plague infection presaged a local human epidemic a flea index of only 3 per rat is held to be scarcely compatible with the occurrence of human plague. [It will be remembered that a *Cheops* index of over 5 has been regarded as likely to produce an outbreak of bubonic plague but JORGE (this Bulletin 1929 Vol. 29 p. 97) has expressed doubts as to the value of this measurement.]

D'AMATO (p. 624) gives a list of recent outbreaks of plague in the Argentine. From investigations carried out in Mendoza, a province of the Argentine DE LA BARRERA (p. 324) concludes that sylvatic rodents there have little contact with domestic rats, and that this accounts for the comparative absence of human plague in the presence of widespread epizootics. Under conditions of great increase of sylvatic fauna as in an abnormally abundant harvest of maize however contact of domestic rats with field rodents is greatly facilitated, and the existence of sylvatic plague is therefore undoubtedly dangerous. PARDAL (p. 625) has found an infected cul in the Province of San Luis in the Argentine. He notes that armadillos are not susceptible to plague.

In the United States, ESKEY and HAAS (p. 324) note that plague has not apparently spread eastwards beyond the Rocky Mountains but that between the west coast and these mountains there is a vast area in which though human infection is rare the epizootic condition is widespread among ground squirrels wood rats and prairie dogs.

BRINGTON (p. 328) shows how infection was found in 32 per cent. of pooled ectoparasites recovered from ground squirrels (*Citellus*) and wood-chucks (*Marmota*) in Wyoming, and reports that plague was the cause of an unusually heavy mortality in prairie dogs (*Cynomys*) in North Mexico an area more than 150 miles from any other known plague infected region. Plague has been found in wild rodents and their fleas in Alberta, Canada, but GIBSON and HUMPHREYS (p. 326) report that as yet no infection has been detected in British Columbia.

HARALSON (p. 626) refers to the centre of plague which still exists on the island of Hawaii, in which rodent and human infection occurs.

In the Annual Report of the Eastern Bureau of the Health Organization of the League of Nations (p. 619) the view is put forward that in tropical and sub-tropical countries plague tends to die out in the lowlands and to spread inland, where it may become endemic in the cooler climate of mountain regions—countries in point are Java and Madagascar. It is pointed out that in the transmission of plague by fleas carried in ships during short voyages it is not the number or species of fleas which are of prime importance but the number of infective fleas, and this depends perhaps entirely on climatic conditions. Plague seasons for different ports do not necessarily correspond.

In the Nilgiri hills, S. India, where plague has been endemic since 1903 GEORGE and TIMOTHY (p. 621) carried out a survey of field rodents, but failed to find evidence of sylvatic plague. The only infected rodents found were *R. rattus* from a definite plague area.

In S. Africa, DAVIS (p. 622) reports that plague is now enzootic in the rodent population over a large area, and human cases have occurred sporadically. Until recently the main source of infection for man was the multimammate mouse *Mastomys natalensis* [which, it will be remembered occupies abandoned nests of the gerbilles *Taterus* and *Desmodillus*, which are the main sylvatic reservoirs of the disease

M. coucha also enters human dwellings and thus forms the link between the gerbilles and man. Recently however *R. rattus* has been the source particularly in the Orange Free State and large numbers have died without traceable infection in the field rodents. It thus appears that *M. coucha* and *R. rattus* are forming reservoirs independent of gerbilles.

VAN HOOFF (p 623) writes of the two foci of sylvatic plague in the Belgian Congo from the one near Lake Albert *R. rattus* is absent (a lot of the rats and fleas concerned in the spread of the disease is given) but in the focus near Lake Edward *R. rattus* is found. KAMAL (p 626) notes that plague is endemic in Egypt and is found in both towns and villages. KAMAL *et al* (p 626) point out that pigeon houses in Egypt where these birds are kept for their excreta which is used as manure are badly infested with rats.

Aetiology and Transmission

BEATYAGAR (p 327) describes the envelope of the plague bacillus which he distinguishes from a capsular structure such as is present in the pneumococcus. Strains of *P. pestis* may be virulent or avirulent and the latter may be protective or non protective for purposes of immunization. Virulent strains possess envelope substance in fairly large quantity protective avirulent strains have less and non protective avirulent strains have no envelope substance but may acquire it if grown on horse serum agar. The largest amount of envelope substance is developed during growth at 37°C. He (p 328) discusses the difficulty in distinguishing between *P. pestis* and *P. pseudotuberculosis rodentium* and that this interferes with the somatic type of agglutination *P. pseudotuberculosis* however possesses envelope substance a common somatic antigen with *P. pestis*. Suspensions made by mixing the two organisms were used for agglutination tests of envelope and somatic antigens and for immunization of animals. The author remarks that to obtain reliable results in the serology of plague and of pseudotuberculosis living organisms should be used, but if killed suspensions are preferred plague bacilli killed by chemicals and pseudotuberculosis organisms killed by heat should be employed.

ESKRY and HAAS (p 324) consider that it is a mistake to judge the degree of flea infestation of rats solely from the numbers collected from the bodies of captured animals. Since this takes no account of those found in abandoned nests. With regard to infection they show that only 32 per cent of exposed fleas were infected by the blood of guinea-pigs found to contain more than 10 bacilli to each microscopical field. Most infected fleas harbour the bacilli until they die usually three days after the time when they are first able to transmit the disease though there may be occasional survivals for as long as 11 days. Before transmission is possible after infection there is in fleas an extrinsic incubation period which may vary from 5 to 100 days. The life of the flea does not seem to be affected by plague infection until blockage occurs when the flea dies of starvation. DAVIS (p 622) also brings out the point that the numbers of fleas found on rats give no indication of the flea population of the habitat of the host. He describes the procedure for collecting fleas from rodent burrows.

and gives a list of fleas commonly caught in association with the rodents and rats of the northern part of the Orange Free State.

BARRETO (p. 322) shows that the most prevalent rat flea in Brazil is *X cheopis* both in rural areas and in ports, and that the next is *X brasiliensis*. MOLL and O'LEARY (p. 321) note that *X cheopis* is the dominant plague flea in the Argentine. ARKERT *et al* (p. 623) give reasons for the opinion that *X cheopis* is established in Kansas and point out that ground squirrels, mice and cottontail rabbits may harbour this flea, though the principal hosts are rats. The presence of this flea is an additional reason for precautions against rats, in view of the eastward spread of sylvatic plague.

Compared with Bombay Calcutta has been relatively free from plague yet RAO (p. 620) has shown that in all parts of the city *X cheopis* is a common flea on the rats. The flea factor is quite favourable for the spread of plague in epidemic form provided that other epidemiological factors are also favourable.

Clinical findings

In Brazil, MACCHIAVELLO (p. 624) refers to a disease known as cold bubo (*síndrome do frio*) or stone fever in which the bubo has a tendency to become ligneous, or to be absorbed, or to recur. This condition has now been proved bacteriologically to be plague. A new plague syndrome is also described, in which there are multiglandular fever, localized suppuration, gastro-intestinal and urinary symptoms, septicaemic fever and wasting, but in which the case mortality is low. KAMAL (p. 626) states that in one epidemic in Egypt it was common to meet a large number of children with enlarged glands, sometimes tender, sometimes painless, but with no other symptoms. He regards these as cases of inapparent or ambulatory plague.

MURDOCK (p. 627) discusses pneumonic plague outbreaks of which have occurred in Ecuador. He considers that such outbreaks almost invariably arise from cases of bubonic plague in which secondary pneumonia has developed, and that the disease is then spread by inhalation to attendants or persons in close contact. The symptoms are described. In most cases the sputum is stringy, with pus and blood, and is usually found, on microscopic examination, to contain plague bacilli almost exclusively. Measures to control spread should be taken at once, and include rigid isolation of patients and contacts, protection of attendants by means of masks, gowns and rubber gloves, disinfection, house-to-house inspection of persons in infected sectors. In this inspection temperatures are taken twice daily and isolation of all persons who show a rise in temperature, regardless of cause, is carried out.

JUNIOR and DE ALBUQUERQUE (p. 628) describe an allergic skin test, for which an emulsion of infected guinea-pig lymph gland was used, and which gave positive results in a few cases of plague. They consider that this test may also be useful retrospectively and thus be of epidemiological importance.

Treatment

BONERABCKER (p. 329) reports on the serum treatment of 111 cases of plague. While admitting that his investigations have not been carried out in such a manner as to make possible definite statistical

proof of the value of serum over bacteriophage or other methods, he has formed the impression that serum benefits the patients and should not be withheld. It should be given early. Duffin in fairly large doses until the temperature falls and the general condition improves. Details of dosage are given. The serum is injected intravenously, intramuscularly and in and around the bubo. KAMAR (p. 628) in Egypt reports that with but doses of serum, pushed to 50-80 cc. each day the results on the whole were gratifying, but KAMAR *et al.* (p. 629) state that combined treatment with serum and sulphapyridine appears to be the best.

WATTS *et al.* (p. 628) have made a comparative study of the treatment of plague with serum, sulphapyridine, sulphathiazole and intravenous saline. In all 25 patients were treated and the results show a significant reduction in mortality in those treated with one of the first three substances over those treated with saline, but there is no significant difference between the results obtained by serum, sulphapyridine or sulphathiazole. In cases of plague septicaemia, however, the two sulphonamides appeared to give considerably better results than serum. In a few pneumonic cases (all fatal) it was noted that plague bacilli could not be found in the blood of those treated with sulphonamides but were present in those treated with saline. CHORSA *et al.* (p. 629) report a case of plague in a child successfully treated with sulphapyridine given both by mouth and, as the soluble sodium salt, intramuscularly. In the Belgian Congo VAN HOOB (p. 629) reports that of 12 patients treated with the sulphonamide preparation Astragone 10 died.

Control.

MILL and O'LEARY (p. 541) refer to the importance of inoculation into animals or pooled fleas in the investigation of rodent plague. ESKAY and HAAS (p. 524) bring out the point that chloroform and ether if used for collecting fleas from rodents, are apt to destroy *F. pestis* and that it is better to use cyanide gas for this purpose. Fleas are transported in 2 per cent. salt solution, which inhibits the growth of putrefactive and other bacteria. The inoculation of fleas from wild rodents is a more reliable method of detecting plague than the examination or inoculation of rodent tissues. JONES (p. 523) states that in the São Paulo area lymph glands of suspected rats from the interior are sent for examination in Froquet's solution—neutral glycerine 20, calcium carbonate 2, distilled water 80. The glands should be removed as aseptically as possible and there should be no delay—the material is used for the inoculation of guinea-pigs or rats.

The author (p. 523) reports on a focus of rat plague in São Paulo over 3,000 rats were killed and plague was stamped out but he remarks that after such a campaign it is necessary to be careful not to assume complete eradication of the disease, which may remain latent for a considerable time. A reduction of the usual proportion of four or five female rats to one male indicates that poison bait is effective for it is the female rat which is specially active in search for food. He notes that special attention was paid to the cultural differences between the non-male *F. pestis* and the male *F. pseudotuberculosis rodentium* in the study of rat plague.

In the *Journal of the League of Nations Public Health Association* (p. 629) it is noted that if the general mortality in a village exceeds 3 per 1,000

per annum, or if more than one death occurs in the same family within six weeks, the bodies of those who die are kept for the M.O.H., who may permit burial. If however acute disease is suspected, punctures are made of the heart liver and lungs and the material obtained is sent to the district bacteriologist for examination. At the same time disinfection of the house and contacts is carried out, and contacts are examined. If plague is found arrangements are made for removing patients to hospital and for isolation of contacts, especially in the case of pneumonic plague.

HOPKINS (p. 629) states that in Uganda the main control measures are those applied to rats and fleas. Rat proofing of stores is provided for by legislation, but is not fully carried out as yet. fumigation of huts with Cyanogas is extensively carried out, but about one-quarter of the rat population survives the gassing. This is unsatisfactory especially as fleas are killed less rapidly than rats. He makes certain recommendations concerning precautions which should be taken in gassing huts. In the Central Provinces of India, and Berar where plague occurs both epidemically and sporadically MAKAND (p. 621) states that Cyanogas A is used for rat destruction.

In Hawaii, HARALSON (p. 626) notes that the chief measure taken against plague is rat eradication by trapping or poisoning with banana-phosphorus bait.

In the Annual Report of the Eastern Bureau of the Health Organisation of the League of Nations (p. 619) the phenomenal decrease in deaths from plague in Java during the period 1934-1940 is referred to. Two entirely different methods of control are regarded as responsible for this—the large-scale improvement of $1\frac{1}{2}$ million houses between 1911 and 1933, and mass vaccination with Otten's living non-virulent vaccine since 1935.

Vaccination

OTTEN (p. 530) gives an account of the investigations which led up to the employment of his live vaccine prepared from the avirulent Tj[il]wide[er] strain of *P. pestis* in Java. He shows that in a trial on a very large scale the mortality from plague fell, in those vaccinated, to about 20 per cent. of that experienced in the controls left unvaccinated. He discusses points important in the preparation of the vaccine, and gives reason for the opinion that a change in the strain towards increase of virulence is not probable.

VAN HOOFF (p. 623) notes that in the Belgian Congo the use of the live vaccine with the E.V. strain of *P. pestis* [from Madagascar] is increasing and that a large number of natives have now been vaccinated without accident.

MOLL and O'LEARY (p. 321) note that although vaccination [presumably with killed organisms] against plague in S. America is commonly used, especially in persons actively dealing with the disease, no very definite conclusions appear to have been drawn as to its efficacy. KAMAL *et al.* (p. 626) report that a very large number of persons in the epidemic areas of Egypt have been vaccinated [presumably with killed vaccine] but although the fatality from bubonic plague is decidedly lower in the vaccinated than in the non-vaccinated, the authors consider that vaccination *en masse* and during an epidemic neither reduces the chance of acquiring the disease nor stops the

epidemic. In Uganda, HOPKINS (p 629) reports that vaccination is only performed in persons who have been specially exposed to the risk of infection
Charles Wilcocks

MALARIA

NOÉ (Juan) & NÉGHME (Amador) Contribución al conocimiento de la epidemiología malarica en la provincia de Tarapaca. III Comunicación. Quebrada de Vitor (Codpa-Chaca) [Epidemiología de Malaria in the Province of Tarapaca Vitor Valley (Codpa-Chaca)]—*Rev Chilena de Hig y Med Preventiva* 1940 Dec. Vol 3 No 3 pp 199-230 With 2 folding maps & 13 plates

Tarapaca is the northernmost province of Chile bordering Bolivia and Peru. The part surveyed consists chiefly of deep mountain gorges through which the River Codpa flows westward through arid pampas to the sea. Malaria is endemic along some 60 kilometres from Chutita 2,200 metres above sea level down to Chacarilla 300 metres high. Where the gorge widens sufficiently fruit trees and vines are cultivated. The total population of this long area does not exceed 500. In a few of the highest settlements the houses are well constructed but lower down cane grass and matting are the building materials most in evidence. The population are well fed but the miserable dwellings are often overcrowded. Needless to say this isolated community has no medical or sanitary service.

The authors spent a week in visiting practically all dwellings in this long narrow area where communications are difficult. In all 319 persons were examined. Malaria was not uniformly distributed communities at the two extremities of the valley were most severely infected. The spleen-rate excluding 37 persons who had contracted malaria elsewhere was 30.6 per cent. the parasite rate was 20.7 per cent. There were 37 *P. falciparum* and 32 *P. vivax* infections. The only anopheline present was *A. pseudopunctipennis*. Of 697 dissected six harboured oöcysts.

Numerous photographs illustrate the type of country

Norman White

TORANZOS (Lazaro B) Los cuatro primeros casos de paludismo en Mercedes (Prov de Corrientes) Tres probables autóctonos. [First Four Cases of Malaria in Mercedes, Province of Corrientes, Three of which Probably Indigenous.]—*Semana Méd* 1941 Aug 14 Vol 48 No 33 pp 406-408 With 4 figs

The Province of Corrientes in the Argentine has hitherto been considered to be free from endemic malaria. Interest therefore attaches to the author's report of four cases of *P. vivax* malaria in June 1940 in three of which infection was almost certainly acquired in the Mercedes Department of Corrientes.

Norman White

RUSSELL (Paul F) & RAO (T Ramachandra) On Surface Tension of Water in Relation to Behavior of Anopheles Larvae.—*Amer J Trop Med* 1941 Nov Vol 21 No 6 pp 767-777 With 1 chart. [13 refs.]

Anopheline larvae attach themselves to the surface film of water by the spiracular plate the palmate hairs the notched organs on the

thorax and the leaf-like appendages on the maxillary palps. When the surface tension of water is reduced from the normal of 70 dynes per cm. to a level varying with different individual larvae from 27-38 dynes by the progressive addition of soap the larvae are unable to hold to the surface and they sink and drown. No significant difference could be found between different species nor was any correlation found between the surface tension of natural waters (no values below 65.5 dynes were recorded) and the presence or absence of larvae. [It would be interesting to know whether the authors have considered the possibility that it is not the surface tension itself but some other property of surfaces, such as the "angle of contact" between water and cuticle, which is the true factor concerned in this phenomenon.]

V B Wigglesworth

WEYER (F) & HUNDETMARK (A) Versuche ueber die Vorzugstemperatur einiger Anophelen bei der Eiablage. [Preferred Temperature for Egg Laying by Some Anophelines.]—*Rev de Malariologie*. Ser I 1941 July-Aug Vol 20 No 4 pp. 251-257

The authors carried out experiments in the laboratory to discover the preferred temperature for oviposition by females of four varieties of *Anopheles maculipennis* (*typicus messiae atroparvus* and *labranchiae*) by offering them bowls of water at different temperatures. *A. superpictus* was also included. There was no significant difference between the temperatures chosen by the different varieties. *A. m. typicus* and *A. superpictus* which normally breed in cooler water showed no preference for this in the laboratory. The lowest temperature chosen was 15°C., the highest 36°C. The preferred range was 26°-30°C., most batches of eggs being in water at 30°C. Newly captured mosquitoes and those reared for many generations in the laboratory gave the same values. Thus the results provide no explanation for the geographical distribution of these forms, nor can temperature be the sole important factor in the choice of breeding places.

V B Wigglesworth.

ASSAM MEDICAL RESEARCH SOCIETY SHILLONG—1931-41 [VISHVA KATHAN (D K) Research Officer] pp 7-16—Malaria Carrying Anophelines in Assam.

The species of Anopheles found in Assam are *A. aconitus* *A. annularis* *A. barbatrostris* *A. calicifacies* *A. hyrcanus* *A. jaypuriensis* *A. kochi* *A. leucosphyrus* *A. maculatus* *A. maculatus* var *willmori* *A. minimus* *A. pallidus* *A. philippinensis* *A. ramseyi* *A. subpictus* *A. tessellatus* *A. umbrosus* *A. vagus* *A. varius*

During 10 years 70 049 mosquitoes were dissected. Infection was found in only six species, *A. aconitus* *A. annularis* *A. calicifacies* *A. maculatus* (and its variety *willmori*) *A. minimus* and *A. philippinensis*.

Of 1 145 *A. aconitus* dissected only one was found infected, a gut infection—it is thus of no importance as a vector.

Nine infected *A. annularis* were found. 16 760 were dissected. The infected specimens were all from Lakhimpur and Gauipur in the Goalpara District. *A. minimus* is very rare in this area and *A. annularis* appears to be the only vector.

A. calicifacies is of very secondary importance as a vector—six infected specimens were found among 1 232 dissected, four in 1935 and two in 1939 all in Lumding.

A. maculatus has been found infected only in Shillong. In 1932, 1933 and 1934 when infected specimens were found *A. minimus* was the chief vector. In 1940 however *A. maculatus* appeared to be the only vector but the degree of malaria prevalence was low. *A. maculatus* in Shillong is markedly zoophilic.

A. philippinensis was found infected on four occasions. 4,239 were dissected.

A. minimus showed an infection rate for the whole ten year period of 5.16 per cent. 725 out of 14,092 dissected. The infectivity rate was 2.8 per cent. It was found infected in nearly all parts of Assam each year. From May to September the sporozoite rates are higher than the oöcyst rates. Sporozoites were found in every month except February.

Norman White

BOYD (Mark F.) On the Varying Infectiousness of Different Patients Infected with Vivax Malaria.—*Amer J Trop Med* 1942 Jan Vol 22. No 1 pp 73-81

To assess the relative importance of factors which might account for the variability exhibited by patients suffering from *P. vivax* malaria in their ability to infect anophelines the author selected data from an extensive series of infection records. Data were selected concerning those patients who had served as mosquito infectors to whom at least three lots of *A. quadrimaculatus* had been consecutively applied and in whom concurrent gametocyte densities had been determined. Data concerning lots of mosquitoes in which no infected specimens were discovered were rejected. Qualitative and quantitative infections are distinguished: the former expresses the percentage of infected specimens encountered in a lot of mosquitoes and quantitative infection expresses the frequency of cysts on the surface of infected stomachs. The author's summary of an interesting paper is as follows:—

Patients infected with *Plasmodium vivax* exhibit a wide difference in their infectiousness for *Anopheles quadrimaculatus*.

Based on the infection resulting in anophelines patients have been distinguished as good and poor infectors. These have not in general differed markedly in gametocyte densities, except that on only a few occasions were the higher densities observed in the poor infectors.

The qualitative and quantitative infection of the mosquitoes infected on patients of either category varies directly with the gametocyte density although at any given density the qualitative infection arising from a feed on a poor infector will more likely be lower than that resulting from an application to a good infector of comparable density.

Although gametocyte densities in good infectors have tended to be slightly higher than in poor infectors the most striking difference lies in the parity of the sexes in the good infectors and deficiency of males in the poor infectors.

Although the data submitted abundantly establish these relationships gametocyte density is not a reliable guide to the probable resulting qualitative infection of mosquitoes.

It is possible that varying proportions of susceptible and refractory mosquitoes in different lots affect the qualitative infection of any lot, particularly when the gametocyte density is low.

These observations also suggest that the gametocytes of poor infectors are inferior perhaps in vitality to those produced in good infectors.

Norman White

BOYD (Mark F.) The Comparative Susceptibility of Two Strains of *Anopheles quadrimaculatus* to Infection with Human Malaria Parasites.—*Amer Jl Trop Med* 1941 Nov Vol 21 No. 6. pp 751-753

"Observations derived from mosquitoes collected in areas separated by about three hundred miles, indicate a very close parallelism in the susceptibility of two insectary strains of *Anopheles quadrimaculatus* to both *P. falciparum* and *P. vivax*"

COGGERMILL (L. T.) Strains of *Anopheles quadrimaculatus*. Inheritance of Color Patterns in the Larvae of *Anopheles quadrimaculatus*.—*Amer Jl Trop Med* 1941 Nov Vol 21 No. 6. pp. 755-763. With 3 charts & 2 figs.

VARGAS (Luis) CASIS (Guillermo) & EARLE (Walter C.) *Anopheles pseudopunctipennis* Theobald, a Vector of Malaria in Mexico.—*Amer Jl Trop Med* 1941 Nov Vol 21 No. 6. pp. 779-783. With 1 chart. [21 refs.]

The importance of *Anopheles pseudopunctipennis* as a malaria carrier is rendered uncertain in many parts of the New World on account of the presence in the same localities of other recognized carriers such as *albimanus* and *larvicularis*. In the region of Morelos around the village of Temixco in Mexico a rice growing region at an altitude of 4 000 ft. with a high malaria incidence, it is shown that *A. pseudopunctipennis* is the only mosquito of importance. It is very plentiful, enters houses, prefers human blood, and was found infected in nature (0.3 per cent. of 1,246 mosquitoes with gland infections, 2.3 per cent. of 528 with oöcysts). Where this mosquito occurs at a lower density along with other species the authors consider that further study is required to establish its importance. V B Wigglesworth.

KOHR (W. H. W.) The Occurrence of *Anopheles darlingi* Root in Central America.—*Amer Jl Trop. Med.* 1941 Sept. Vol 21 No. 5 pp. 639-670 With 4 figs. (1 map). [17 refs.]

"The dangerous vector of malaria, *Anopheles darlingi* Root, has been found in three places in Central America, in British Honduras, in Guatemala, and in Spanish Honduras. It has not hitherto been known north of Venezuela, in South America.

"Severe malaria is known to be present in British Honduras and in Guatemala, and this may be associated with the presence of *A. darlingi*.

"The species has probably been present for at least 15 years in Spanish Honduras.

"The present status of *A. darlingi* in Central America is discussed.

"Notes on the literature, showing the very high natural infection rates of this species in South America, are given.

"Suggestions as to future investigations are outlined."

ROZENBOOM (L. E.) FOX (L. A.) & LAND (R. L.) *Anopheles (Kertessia) bellator* D. & K., found Naturally Infected with *Plasmodium*.—*Science*. 1941 Aug. 1 Vol 84. No. 2231 p. 114.

A. bellator though anthropophilic, does not remain in houses after it has fed, and is, therefore, hard to catch unless human bait is prepared.

The authors succeeded in capturing a considerable number almost all of which appeared to be young females taking their first blood meals but the 398th specimen dissected was found to have a single large oöcyst which was ruptured beneath the coverslip with the release of large numbers of motile sporozoites

ROZEBOOM (L. E.) & GABALDON (A.) A Summary of the *Taralmaoulatus* Complex of *Anopheles* (Diptera Culicidae) — *Amer J Hyg* 1941 May Vol. 33 No 3 Sect. C pp 68-100 With 4 plates [21 figs.] C IV

BOYD (Mark F.) KITCHEN (S. F.) & MATTHEWS (C. B.) On the Natural Transmission of Infection from Patients Concurrently Infected with Two Strains of *Plasmodium vivax* — *Amer J Trop Med* 1941 Sept Vol. 21 No 5 pp 645-652. With 2 figs.

In a previous paper the authors reported that the simultaneous presence of two strains of *P. vivax* appears to delay the development of an adequate homologous immunity to either strain [see this *Bulletin* 1939 Vol. 36 p 493]. This paper deals with the ability of anophelines to transmit either or both strains when infected from patients who had received simultaneous inoculation of trophozoites of two strains of *P. vivax*. The strains used were the McCoy and Cuban strains. Such mosquitoes were first used to infect susceptible patients. While the subsequent infection was clinically active the blood of the patient was subinoculated into convalescents from infections of the McCoy and Cuban strains respectively. The originally susceptible patients after their clinical recovery were reinoculated with the blood of patients showing clinically active infections with the McCoy and Cuban strains. Two such experiments were made the results were not clear-cut. The Cuban strain was present in the test case in both experiments. In one experiment the McCoy strain was not demonstrated in the test case in the second it seems to have been present in the test case before inoculation into convalescent patients.

It would appear that anophelines infected on a person concurrently infected with two strains of a single species (*P. vivax*) may either (a) become infected with but one of the strains or (b) may possibly become infected with both of the strains and simultaneously propagate both. The experiments have not thrown any light on the possibility as to whether hybridization has or has not occurred under the second circumstance

SCHÜFFNER (W.) Zur Klinik der Malaria. [Some Clinical Aspects of Malaria.] — *Dtsch Med Woch* 1941 Nov 14 Vol. 67 No 46 pp 1251-1256 With 10 figs. Norman White

In a lecture at the Berlin Medical Association in July 1941 Schüffner dealt with a few of the clinical aspects of malaria on which research has thrown new light during the past 20 years. Some of the points specially stressed are as follows —

A thorough examination of a thick drop preparation by a competent person always gives positive results provided that the blood has been taken during a febrile paroxysm a negative finding during fever free intervals does not exclude malaria.

In benign tertian infections relapses occur in at least 50 per cent. of the cases irrespective of the kind or duration of the treatment. A

short course of treatment with quinine or atabrin followed by the treatment of relapses as they occur saves the patient from the unpleasant effects of the drugs.

The frequent occurrence of a very prolonged incubation period in benign tertian infections is probably related to the existence of a cycle of development of the parasites in the reticulo-endothelial system. The "initial fever" of a continued or remittent type which occurs in benign tertian lasts from one to six days. It is caused by a toxin of a different kind from that which is responsible for the intermittent paroxysms which follow. It never occurs in relapses or in later attacks and is resistant to quinine. It gives rise to a firm and lasting immunity against the special toxin which is concerned in its production. Some workers go so far as to assert that when the initial fever does not occur the case must be one of relapse or of a later infection never of a first attack.

Several other points are dealt with in the lecture but most of them are of minor practical interest.

JOHN W. D. MCGEE

WRIGHT (Frederick J.) Cerebral Malaria.—*East African Med J* 1941 Nov Vol. 18 No. 8 pp 228-235

This paper gives clinical notes of 16 cases of cerebral malaria. They illustrate the very diverse symptoms which may occur some of which may cause considerable diagnostic difficulty. When blocking of cerebral capillaries by developing forms of *P. falciparum* occurs there is generally a gradual onset of coma. Sudden onset is usually caused by an embolism of malaria parasites. In such cases few or no parasites may be found in the peripheral blood. Epileptiform attacks may occur and these may indicate the focal nature of the cerebral infarction. Malaria is responsible for a number of admissions to mental hospitals. Seven such cases are cited. Three presented a schizophrenic state in which malaria may have played a precipitating rôle. A confusional state was noted in three of these patients. The pathology of such cases is not fully known. Other organic diseases are followed by similar psychoses.

Cases of cerebral malaria may simulate meningococcal or pneumococcal meningitis. Lumbar puncture is necessary in all doubtful cases. Virulent pneumonia, septicaemia, plague, typhoid fever, tuberculous meningitis, trypanosomiasis, head injury and alcoholic excess may all produce symptoms similar to those sometimes seen in cerebral malaria. Irritative phenomena may suggest tetany. Even tetanus may be closely simulated. Permanent paralysis may result from cerebral malaria.

In the treatment of these cases the author relies on the use of intramuscular and oral quinine. Quinine given intravenously has in his hands given but indifferent results. Having regard to the depth of coma which may be produced the large number of cases that recover places cerebral malaria among the most favourable forms of coma to treat.

NORMAN WATKIN

MENDOZA (Mariano) & HUAMAN (Nico) Síndrome cerebeloso de origen malarico [Cerebellar Syndrome of Malarial Origin].—*Rev. Neuro-Psiquiátrica*, Lima 1941 Vol. 4 No. 1 pp 106-112.

The authors describe the case of a boy 13 years of age, who, during the course of a *P. vivax* infection, developed symptoms of incoordination and disequilibrium characteristic of a cerebellar lesion. The

functions of the cerebellum are discussed and reference is made to reported cases of cerebellar involvement during the course of or as a sequel to various infections including malaria. The ways and means by which the central and peripheral nervous system may be attacked by the malaria parasite or its toxin come in for discussion. On all these topics reference is made to recent literature. *Norman White*

WILE (Udo J) & MUNDT (Leslie K) Avoidance of Fatal Complications in Therapeutic Malaria.—*Arch Dermat & Syph* 1941 Dec. Vol 44 No 6 pp 1078-1081

Of over 1 000 patients who have received therapeutic malaria in the University Hospital Ann Arbor Mich 29 died as a result of this treatment. The immediate causes of death were peripheral circulatory collapse 12 pneumonia 5 hyperpyrexia 5 suicide 2 and erysipelas, cerebral thrombosis bleeding duodenal ulcer ruptured spleen and respiratory failure one each.

Caution is required in the selection of patients for this treatment. The authors prefer not to treat patients over 55 years of age. Contra indications to treatment are severe cachexia, diabetes, nephritis with renal insufficiency hepatitis with insufficiency active pulmonary tuberculosis severe anaemia extreme old age and obesity. Malaria therapy should only be given to patients whose hearts are well compensated. All necessary measures to improve the health of the patient should precede malaria therapy.

Symptoms arising during treatment and which are danger signals, are listed. They may necessitate the interruption of the treatment. A temporary remission secured by the administration of thio-bismol just before an expected chill may be very useful [see this *Bulletin* 1941 Vol 38 p 178].

Blood transfusion is the most efficacious treatment for peripheral circulatory collapse severe anaemia jaundice and persistent hypotension that may arise during malaria therapy all respond well to blood transfusion. *Norman White*

FIGUEROA (Isabel) Breve estudio sobre las quininas colombianas [The Colombian Cinchonins].—*Bol d Inst Nac de Hig Sanper* Martinez Bogotá 1942 Jan 24 No 5 pp 9-19 With 7 figs.

The author has analysed two species of cinchona in the National Institute of Hygiene viz *C. laucifolia* and *C. cordifolia*. A totaquina prepared from the native plants gave the following average percentage composition. Quinine 45.55 cinchonidine 10.79 quinidine, 4.59 cinchonine 3.31 amorphous alkaloids 10.76 resin 5.12 inert excipient 8.00 moisture 11.88. In a table is given a list of 80 samples with the amount of total alkaloids and of quinine as sulphate in each.

H H S

JACOVACCI (Roberto) Terapia della tertiana benigna mediante gli acridinici [Treatment of Benign Tertian Malaria with Acridine Derivatives].—*Riv di Malarologia* Sez. I 1941 July-Aug Vol. 20 No 4 pp 294-300 French summary (4 lines)

The author reports on the treatment of 24 primary cases and 55 relapsing cases of *P. vivax* malaria with Italchima an acridine derivative in conditions which rendered the possibility of reinfection unlikely. The drug was given in a dose of 30 cgm a day for 5 days. In no case were there any signs of intolerance nor was there any staining of the

[July 1942]

skin. Fever was suppressed in the majority of cases on the third day. Of the 24 primary infections only one relapsed within the period of observation. Of the 55 patients suffering from relapses, 12 had a subsequent relapse and one had two. The general condition of these 55 patients was more debilitated than that of sufferers from primary attacks. The author considers *Italcuma* to be without rival in the treatment of benign tertian malaria. [See also this Bulletin 1941 Vol. 33 p. 34.]

Norman White

FISCHER (Otto) & STAUPENDAHLE (Wilhelm). Zwei Fälle von gleichzeitiger Cholin- und Atebrinüberempfindlichkeit. [Two Cases of Supersensitiveness to Both Quinine and Atebrin.]—*Med. Klin.* 1941 Nov. 28. Vol. 37 No. 48. pp. 1201-1204. With 1 chart.

These two cases indicate that atebrom is not always so harmless as is generally believed in cases of intolerance to quinine. In each case a mild attack of urticarial dermatitis followed the administration of one or more prophylactic doses of quinine and when this drug was replaced by atebrom the result was a severe attack of dermatitis with pronounced constitutional disturbance.

The first patient a medical man took a single dose of 0.3 gramme quinine and had swelling of the dorsum of the penis with slight urticaria of the inner aspects of the thighs lasting about one day. Three days later he took 0.2 gramme atebrom and repeated the dose of the following day. Two days after starting the course of atebrom he had a sharp attack of urticaria, affecting the thighs and one arm this cleared up in two days. Another similar course of atebrom was given about a week after the first. This was followed by a more severe and prolonged attack of urticaria. A week later the urticaria recurred and was even more severe than before. This time the patient felt seriously ill and there was a trace of albumen in the urine. After recovery from these attacks this patient was found to have become supersensitive to various articles of diet—fish, strawberries and spices—he was also intolerant of sunlight X-rays and radium. An injection of general sensitiveness had caused a severe reaction.

The second patient gave no history of any kind of supersensitiveness. He had taken prophylactic quinine in doses of 0.3 gramme daily for three weeks without ill effect then he had a blue-red swelling of both arms and legs. Quinine was continued for another week, in the course of which the swelling became somewhat less, but was still visible. Quinine was stopped and he was given about 0.16 gramme atebrom daily for two days the swelling increased and within two days he had high fever which was suspected to be malarial so he was given 0.3 gramme atebrom in divided doses. He became much worse the temperature continued high for seven days and then fell steadily to normal in the course of the next three days. On the seventh day of the fever the total leucocyte count was only 1,900 a week later it was 11,000. There was severe generalized dermatitis with yellow staining of the skin, the liver was enlarged the urine was heavily bile stained and contained a few red blood corpuscles. The patient was seriously ill and made a fairly rapid recovery.

In most of the serious forms of intoxication previously reported as being due to atebrom the doses have been large. These two cases are exceptional in following small doses. The confidence of the authors in

atebrin has not been shaken by the occurrence of these exceptional cases but it is suggested that preliminary test doses of atebrin should be given to persons who are specially sensitive to quinine or other drugs and that those who are found to be supersensitive should not be allowed to go to malarious places.

John W D Megaw

RUSSELL (Paul F) *A Classification of Measures of Malaria Prophylaxis and Mosquito Control—Amer J Trop Med* 1941 Sept Vol. 21 No 5 pp 681-687

Some malarialogists may doubt the utility of any attempt at rigid classification of measures of malaria prophylaxis and mosquito control. The author of this elaborate and complete classification realizes that many dividing lines are not clear-cut except by arbitrary rulings. For those who find such classifications useful this paper will be helpful.

The author's limitation of the application of the term *naturalistic* is commendable. He does not consider such measures as sluicing to be naturalistic. His definition reads: A naturalistic measure of mosquito control is one that without primary dependence on chemical or mechanical measures or water manipulation deliberately extends or intensifies natural control.

Norman White

ASSAM MEDICAL RESEARCH SOCIETY SHILLONG—1931-41 [VISWANATHAN (D K) Research Officer] pp 23-45 With 12 graphs.—
Notes on Centres where [Malaria] Control Measures are in Progress.

The Assam Medical Research Society has during the past 10 years been actively engaged in malaria control in many parts of the Province and in this part of its report a summarized account is given of the measures employed and of the results achieved. Anti larval measures oiling and Paris green sluicing and shading and attack on the adult mosquito by spraying with Pyroicide 20 are prominent among the methods employed. Some noteworthy successes are reported. Some of the results achieved are given below in tabular form —

	Population	Spleen rate	Parasite index	Spleen rate	Parasite index
Nowgong	10 413	50.8 (1935)	32.5	4.3 (1940)	2.0
Gauhati	21 797	21.6 (1934)	24.0	2.9 (1940)	1.2
Mangaldai	1 696	31.5 (1934)	25.7	3.8 (1940)	1.5
North Lakhimpur	2,120	31.6 (1934)	46.4	11.9 (1940)	5.9
Doom Dooma	1 900	56.5 (1932)	40.0	11.7 (1940)	9.2
Jagadishpur group of villages	2,000	48.0 (1935)	40.0	7.5 (1939)	4.2
Bokpara and Budla Beta Tea Estates	4 900	78.8 (1936)	66.0	43.4 (1940)	27.0
Poloi Tea Estate		67.2 (1936)	91.6	39.2 (1941)	60.4

In all these places as nearly everywhere in Assam *A. minimus* is the most important if not the sole vector

Norman White

BROWN (Omar J.) & WARR (Robert L.) Observations on Mosquito and Malaria Control in the Caribbean Area.—*U.S. Nav. Med. Bull.* 1941 Oct. Vol. 39 No 4 pp 614-631 With 3 figs. (2 on 1 plate) [13 refs.]

Somewhere in the Caribbean area in a locality undisclosed for military reasons, a naval station and a marine camp were constructed. Malaria is mildly endemic in the part of the island concerned. Epidemic malaria may occur when conditions are favourable. The station however is fairly well removed from neighbouring towns. The advent of some 3 000 native workmen 2.5 per cent of whom harboured malaria parasites and rather extensive actual and potential breeding places for *A. albopictus* the local vector seem to have been the chief factors causing the outbreak of malaria that is described. Rainfall from October to March was much in excess of the normal. The subsoil is impervious.

The authors describe the measures taken to control the disease. There was nothing unusual about these measures unless it be the use of an animal-baited mosquito trap which is described and illustrated. The paper is designed for the edification of medical officers with little or no practical experience of malaria control for them the paper should be of interest.

WATSON (Robert Briggs) & RICK (Margaret E.) Further Observations on Mosquito-Proofing for Malaria Control.—*Amer. J. Hyg.* 1941 Nov Vol 34 No 3 Sect C pp 150-159 With 3 figs.

A previous publication reported the results in malaria prevention obtained in 1938 by mosquito-proofing 98 houses in the Harris Station Area near Lake Wheeler in the Tennessee Valley [see this Bulletin 1942, Vol. 39 p 281]. Forty-five unscreened households in the same area served as a control. That work has been considerably extended. Before June 1939 all houses in that area, 207 in all, had been mosquito-proofed. In another area on the shores of Lake Wheeler Cotaco Creek, 131 houses have been similarly dealt with. This work was begun in June but not completed till August 1st well on in the transmission season. A third area, Bockeye Swamp in which anophelism was comparable with that of the other two areas, was used as a control here 173 families living in unscreened houses were kept under observation. In Harris the negro and white populations are almost equal. The population of Cotaco is predominantly white that of Bockeye predominantly negro.

Each household in the three areas was visited at intervals of not more than 10 days mostly once a week. A house-to-house malaria survey was made at the end of April, at the beginning of August and early in October that is before the height of and after the season of malaria transmission. In these surveys an attempt was made to obtain blood-films from all individuals. The statistical method employed in the quantitative evaluation of the results was described in the previous paper.

It would seem that protection offered by mosquito-proofing becomes fully operative during the first season of malaria transmission in which it is employed, and that protection during a part only of the transmission season results in a marked reduction in the rate of transmission. The amount of protection afforded by mosquito-proofing is very considerable. The percentage positive blood films in the October survey

were Harris Station 2 38 Cotaco Creek 2 25 and Buckeye Swamp 17-95 These rates were standardized for race Norman White.

Roy (D N) & Roy (P C.) Observations on the Relationship between Malaria and Pistia in Two Villages in Murahidabad District.—*Indian Med Gaz* 1941 Sept Vol. 76 No 9 pp 538-542. [10 refs]

P C Roy Health Officer of Murahidabad, had been impressed by the unvarying presence of *Pistia stratiotes* in tanks and other anopheline breeding places in those parts of his district in which malaria was most prevalent. Two villages a quarter of a mile apart were selected. In one village all *Pistia* was removed from the numerous tanks other types of aquatic vegetation being left. In the second village *Pistia* alone was left other aquatic vegetation being removed. Eighteen months later there had been a remarkable decrease in malaria incidence in the *Pistia* freed village and an equally remarkable increase in the other. Death-rates infant mortality rates and even birth rates were affected. Unfortunately it was not possible to identify the local vector. A strong suspicion rests on *A. philippinensis* even though Sinha recorded only one adult and we found none Norman White

MISRA (Ananga Kumar) A Method of clogging Streams and Drains by an Automatic Drip System.—*Indian Med Gaz* 1941 Dec Vol. 76 No 12, pp 739-740 With 2 figs

A bottle is filled with oil, and the cork inserted. Through the cork is passed glass tubing $\frac{1}{4}$ inch in diameter and 2 inches in length so that some of the tubing projects from each end of the cork. Through the tubing are placed 6-12 stems of dried thatch grass protruding beyond each end of the tubing. The bottle is inverted over running water and the oil drips steadily. The bottle is inverted over running water and the oil drips steadily. one pint is enough for 4-6 hours and will efficiently oil a stream 2 feet wide and 600 yards long.

A second type is made with a wide mouth bottle through the cork of which are placed two glass tubes $\frac{1}{4}$ inch in diameter. The bottle filled with oil is placed in the stream with the mouth facing the flow and so that one glass tube is submerged. Water is forced into this by the flow and an equivalent amount of oil is forced out of the other tube on to the water surface.

Both these methods are said to be effective

C IV

REKSODIWIROJ Een paar eenvoudige automatische afwatering skleppen. [A Couple of Automatic Drainage Valves.]—*Geneesk Tijdschr v Nederl Indis* 1941 Nov 25 Vol. 81 No 47 pp 2531-2534 With 5 figs.

The Calco valve is used in the sanitation of malarial regions to shut automatically at flood tide and to open off surface drains with the ebb tide. Some water gets into the system before the tidal pressure is sufficient completely to close the valve. The sluices used by the people of Karimoen a sub-district of the Netherlands East Indies are on precisely the same principle and are intended to prevent sea or brackish water entering the superficial ground water drains of their gardens. In the use of these sluices to close the surface culverts as an

antimalarial measure the surface drain has its outfall in the deep discharge drainage cutting and the door is of iron. The substitute for this is a wooden door of one inch thickness hanging on two vertical supports. Instead, however of having the surface drain with the door at its end, opening into the deep channel, the author proposes to place the sluice arrangement a little way in from the actual final opening. He constructs a hollowed tree bole to operate on the superficial drain and to have the sluice door on its outer end. In this way a complete closure and opening is much more easily effected with the tidal ebb and flow. Two varieties of this sluice system are suggested and the plan of the whole is clearly given in a series of line drawings.

W F Harvey

ERZCITO (Antonio) Field Experiment on an Automatic Siphon Sluice in Malaria Control (Design III).—*Acta Med Philippina* 1941 July-Sept. Vol 3 No 1 pp. 129-145 With 9 figs 2 plans & 3 sketches.

FRAMPOLINI (Natale) La bonifiche dell'Albania. [Bonification in Albania].—*Riv di Malarologia* Sez I 1941 July-Aug Vol 20 No 4 pp 258-270 With 10 figs French summary (6 lines)

This is an illustrated description of the extensive malarious regions still to be found along the coast of Albania, which the Italian Government in collaboration with Albania intend to reclaim one day. It constitutes a grandiose programme. The technical hydraulic problems involved are discussed. A brief account is also given of the bonification work that has already been carried out in Albania, descriptions of which have already been published.

Norman White

AFRICA (Candido M) & DY (Francisco J) Some of the Outstanding Achievements in Malaria Research during the Last Twenty Years.—*Il Philippine Med Assoc* 1941 Oct. Vol 21 No 10 pp 481-486 [18 refs]

DEVINE (J) & FULTON (J D) Observations on the Nature of the Malarial Pigment present in Infections of Monkeys (*Macacus rhesus*) with *Plasmodium knowlesi*.—*Ann Trop Med & Parasit* 1941 Oct 21 Vol 35 No 1 pp. 15-22 [12 refs]

The authors discuss the more recent work on the nature of the pigment produced by *Plasmodium knowlesi* during its growth within red blood corpuscles. It is noted that though SUTTON and GHOSH, 1934 [this Bulletin 1935 Vol 32, p 127] came to the conclusion that the pigment is haematin they actually failed to differentiate it from haematin chloride (haemin) which resembles it spectroscopically. In the present paper the authors describe their chemical and spectroscopic observations which indicate quite clearly that the pigment is indistinguishable from haematin.

C M Weyon

FULTON (J D) & YORKE (Warrington). Studies in Chemotherapy XXIX.—The Development of Plasmoquine-Resistance in *Plasmodium knowlesi*.—*Ann. Trop Med & Parasit* 1941 Dec. 31 Vol. 35 No 2. pp 233-239

It was shown that *Plasmodium knowlesi* infections in *Macacus rhesus*, invariably fatal if untreated, could be controlled by four daily

intramuscular injections of plasmoquine in doses of 3.3 mgm. per kilo of body weight. After this treatment parasites were absent from the blood for two to six days. Relapse then occurred and if untreated proved fatal. By repeated treatment in the above doses death could be averted for some weeks if not entirely. In one animal the first repeated treatment produced a negative phase but the second repeated treatment failed to do so. This strain inoculated to another monkey produced an infection which failed to disappear with a dose of 3.3 mgm. per kilo of body weight. A four-day course with double this dose likewise failed. This course was followed by a two-day course of 13.2 mgm. per kilo of body weight. Even this had no effect on the parasites, the animal dying of a heavy infection. The strain passed on to the next monkey was found to be uninfluenced by a four-day course of 13.2 mgm. per kilo of body weight, the maximum dose tolerated by the monkeys. It was evident that the strain of *P. knowlesi* originally controlled by a dose of 3.3 mgm. per kilo of body weight by repeated exposure to the drug had become so resistant that it failed to be influenced by four times this dose. Scarcity of monkeys prevented the stability of the resistance being estimated by treatment after further passages.

C. M. Wenyon

BOYD (G. H.) & DUNN (M.) The Method of Action of Atabrine upon the Avian Malaria Parasite, *Plasmodium cathemerium*—*Amer Jl Hyg* 1941 Sept Vol 34 No 2 Sect C. pp 129-131
With 1 fig

In an earlier paper [this *Bulletin* 1940 Vol. 37 p 189] the authors described experiments designed to throw light on the mode of action of quinme and plasmoquine on *Plasmodium cathemerium* infections in canaries. It was there indicated that both these drugs inhibit the occurrence of reproduction and cause a reduction in size of the schizonts so that fewer merozoites are produced. The actual rate of destruction of parasites is not however increased. In fact the actual rate of disappearance of parasites from the peripheral blood is greater in untreated than in treated birds. The observations on atabrin which are the subject of the present paper show that this drug has effects similar to those of the two previously tested. In the doses actually used atabrin produced results more quickly than the others but this may be due merely to the dosages employed.

C. M. Wenyon

BECKMAN (Harry) Atabrine Retardation of Schizogony in *Plasmodium cathemerium* Infected Canaries.—*Amer Jl Trop Med* 1941 Nov Vol 21 No 6 pp 785-801

When atabrin is administered to a bird infected with *Plasmodium cathemerium* certain changes occur. These are diminution in pigment accentuation of vacuolation, reduction in number of merozoites, retardation of growth and raggedness of outline. Of these retardation of growth was selected as being the most promising criterion of the action of atabrin. Infections induced by the injection of sporozoites were allowed to develop for a few days and blood films were made at a certain time. These were examined and the proportion of large to small parasites noted. Twelve hours later 0.1 mgm. of atabrin was injected intramuscularly and 12 hours later blood films were again made. As the cycle of development of the parasite is 24 hours, if there had been

no retardation of growth the proportion of large to small parasites should have remained the same as in the films made 24 hours earlier. It was found, however that the proportions had been reversed. Thus in one case in the first film 82 per cent. of the parasites were large and 12 per cent. small. After treatment 23.5 per cent. were large and 76.5 per cent. small. It is possible that this phenomenon may be utilized for the comparison of antimalarial agents but before this can be asserted further and more extended observations will have to be made.

C M Weyon

COULSTON (Frederick) & MAXWELL (Reginald D) *Single-Parasite Infections and Exoerythrocytic Schizogony in Plasmodium circumflexum*—*Amer J Hyg* 1941 Sept. Vol 34 No 2, Sect. C. pp 119-125

By the methods of micromanipulation and serial dilutions the authors have succeeded in producing infections in canaries by the inoculation of single parasites within a red corpuscle. The infections thus produced are exceedingly slight, considerable search being required in some cases to discover a single parasite. On sub-inoculation the infection is heavier while subsequent passages result in intense and fatal infections. Exoerythrocytic schizonts were never found in the primary infections nor in those of the first passages. They appeared regularly after a number of passages had been made when the infections were heavy. These experiments would seem to indicate without any doubt that exoerythrocytic schizonts may originate from the pigmented stages in the red blood corpuscles. Furthermore it would seem that they develop when the defence mechanism of the host is at some disadvantage and in this respect they may be regarded as abnormal forms.

C M Weyon.

VARGAS (Luis) & BRITAIN (Enrique) *Culex quinquefasciatus* a New Vector of *Plasmodium gallinaceum*.—*Science* 1941 Oct. 24. Vol 94 No. 2443 pp. 389-390

TRAGER (William) *Studies on Conditions affecting the Survival in Vitro of a Malarial Parasite (Plasmodium lophurae)*—*Jl Exper. Med* 1941 Nov 1 Vol 74 No 5 pp 441-462 With 2 figs. on 1 plate. [33 refs]

As the author points out, very little is known regarding the factors which influence the survival of malarial parasites when kept in various liquid media. To throw some light on the problem the investigations on *Plasmodium lophurae* from infected chickens described in this paper were carried out. Blood from infected chickens was drawn off into heparin sodium chloride solution. The mixture was centrifuged and the deposit of infected and uninfected red cells was re-suspended in small Erlenmeyer flasks in a balanced salt solution having a high potassium content. To this balanced solution other ingredients the influence of which was to be tested, were added as required. The criteria of survival were the infectivity of the suspension, the morphology of the parasites, the number of parasites present and the exflagellation of the male gametocytes. The temperature of the experiments varied from 39.5°C. to 42°C. The results showed that survival was better in the balanced salt solution than in other similar mixtures.

Survival was still further favoured by aeration by increasing the density of parasites up to an optimum by frequent renewal of the suspending medium by the addition of concentrated red cell extract by an optimal concentration of plasma or serum chick embryo extract glucose or glycogen glutathione and probably yeast or liver extract. In the best preparations as judged by infectivity more than 40 per cent. of the parasites were alive on the third day more than 20 per cent. on the fourth day and perhaps one per cent. on the fifth day and about half this percentage on the sixth day. There was evidence that the parasites multiplied during the first day while an increase in the number of flagellating cells was an indication that development of male gametocytes was taking place. It is pointed out that the capacity of the male gametocytes to exflagellate is as good a test of survival as the determination of infectivity and is much easier to carry out.

WALKER (H A.) & VAN DYKE (H B) Control of Malaria Infection (*P. lophurae*) in Ducks by Sulphonamides.—*Proc Soc Exper Biol & Med* 1941 Oct Vol 48 No 1 pp 368-372. [10 refs.] C M Wenyon

The authors have tested the action of three sulphonamides (sulphanilamide sulphathiazole sulphadiazine) on *Plasmodium lophurae* infection in young ducks by incorporating the drugs in the food of the ducks in 5-16 days. Under the influence of the drugs the infection is checked after a few days so that the ducks survive for several weeks with few parasites in the blood. Of the three drugs tested sulphanilamide was the least effective. C M Wenyon

TRAGER (William) The Effect of Intraperitoneal Injections of Carbon Ink on the Course of *Plasmodium lophurae* Infections in Chickens.—*Amer J Hyg* 1941 Nov Vol 34 No 3 Sect C pp 141-149 With 2 figs. [16 refs.]

If chicks two or three days old are inoculated intraperitoneally, intracardially or intracerebrally with large doses of *Plasmodium lophurae* they develop intense infections with a peak on the fifth to seventh day followed by a rapid reduction in the number of parasites. In chickens more than three weeks old the peak is reached on the third day or sooner. If with inoculation of parasites to the older chickens injections of carbon ink into the posterior peritoneal cavity are commenced the chickens behave like the younger chicks the peak of the infection being reached later. It seems clear that the older chickens are able to develop a resistance to the parasites more quickly than the younger chicks but this development is interfered with by the ink injections which bring about a blockage of the lymphoid macrophage system. The interference was with acquired rather than natural immunity for the rate of increase of the parasites during the first three days was the same in treated and untreated chickens. It is remarkable that when the ink was administered intracardially no interference was noted though this method of administration produced a greater degree of blockage of the lymphoid macrophage system.

C M Wenyon

TRYPANOSOMIASIS.

NIGERIA REPORT ON THE MEDICAL SERVICES FOR YEAR 1940 [BRIER CLIFFE (Rupert) Director] Appendix B. pp. 15-16.—Report of the Sleeping Sickness Service, 1940.

In consequence of the war there was only one sleeping sickness team at work during 1940 in the Benue Province but the great reduction in the infection rate in the Northern Provinces has made it possible to stop the surveys. During the year 19,596 new cases were found and about 33 000 new and old, were treated in the Benue Province the infection rate was 9.7 per cent. Areas previously treated now show an infection rate of 1.7 per cent. There is still a high incidence in labourers in the Kabba, Ilorin and Niger goldfields.

Resettlement in the Anchau corridor has progressed and much of it has been made fly free. In parts of the Katsina Emirates 233 miles of clearing near villages, watering places and fords have been completed and the bulk of 123,000 people there should now be safeguarded in their home areas.

C. W.

GRIBBS (E. G.) Studies on the Bionomics, Control and Natural Infection of the Riverine *Glossina palpalis* Subspecies *juvipes* Newstead in the West Nile District of Uganda.—*Ann. Trop. Med. & Parasit.* 1941 Dec 31 Vol 35 No 2. pp. 185-220. With 5 graphs, 1 map 2 figs. & 2 plates. [16 refs.]

Sleeping sickness is still endemic in the West Nile district of Uganda this paper describes the natural history of *Glossina palpalis* in the area and bases recommendations for control upon an experimental study of the factors influencing the prevalence of the fly. *G. palpalis* is confined to the immediate vicinity of rivers and streams along which it may range for miles, often flying over the open water. Its numbers can be reduced to a safe level of less than two flies per boy-hour by what the author calls "rod clearings." These extend only 10 yards in width on either side of the river. But to be effective they must be at least 800 yards in length with the road crossing, or village that it is desired to protect in the middle. Rod clearings are effective only if the grass is kept short when tall grass is allowed to grow they may be more favoured by tsetse than the untouched forest. Tall trees can safely be left provided the branches are cut away up to 15 feet from the ground. Growth on the islands in the rivers must also be kept short.

The factors limiting the fly to the water courses are uncertain humidity has no influence perhaps the food supply in the form of lizards and monitors is important. The effectiveness of the narrow clearings seems to be due to their preventing the fly from lingering along that section of the stream and perhaps exposing it more to the attacks of the large numbers of predacious dragon flies. Among 2,945 flies examined no gland infections were found, but 10 per cent. of 248 flies showed flagellates in the gut.

V. B. Wigglesworth.

JACK (R. W.) Report of the Division of Entomology [Southern Rhodesia] for the Year ending 31st December, 1939.—35 pp type script 1940 Salisbury S Rhodesia [Summary taken from *Rev Applied Entom* Ser B 1942 Jan Vol. 30 Pt 1 p 8.]

The major portion of the medical and veterinary section (pp 12-26) of this report deals with work against *Glossina* spp. In the northern districts, the position with regard to *G morsitans* Westw. is very satisfactory. The formerly infested country that had been cleared of fly by the end of the year amounted to at least 6 000 sq. miles. The infested areas in these districts are now relatively remote from the European settlement although settlement is being extended in two sections as a result of the retreat of the fly. In all the districts native cattle have been returned to areas from which they had been driven by the encroachment of the fly and many roads closed to ox transport have been reopened. While the reduction in game that is involved is regretted the result could not have been achieved within economic limits by any other measure.

In the Chipinga subdistrict (Metsotter Border) trypanosomiasis caused serious loss of cattle during the year. The border clearing has been crossed apparently freely by tsetse flies during the past two years in spite of annual widening at suspected weak places. The deterioration in the position may be due to an increase in the density of the fly on the Portuguese side of the clearing. *G brevipalpis* Newst. apparently crossed the clearing more freely than *G pallidipes* Aust. This might be due to a possible greater density of the former species on the edge of the clearing or to its crepuscular and nocturnal habits. Its predominance considerably affects the usefulness of traps as it is not readily taken in them. The advance of *G morsitans* in Portuguese territory towards the border at the southern end of the Metsotter district has apparently continued. The operations against *Glossina* spp. in individual districts are surveyed in detail by J. K. Chorley.

Chrysomya bezziana Villen. continues to be a serious pest of cattle in many localities. Several cases of infestation of man by *Cordylobia anthropophaga* Grunb. were reported at Salisbury as well as two cases of intestinal myiasis due to unidentified species of *Sarcophaga* and a case of the infestation of the urinary tract of a European child by a Coleopterous larva. *Anopheles funestus* Giles was unusually common in the neighbourhood of Salisbury from March to July and *A. gambiae* Giles was very abundant during April at a camp in the Hartley district and was observed to bite man during the daytime. *Culicoides mor natipennis* C. I. & M. caused much annoyance at various localities in the Wankie district during the months of May and December.

JACK (Rupert W.) Further Studies in the Physiology and Behaviour of *Glossina morsitans* Westw.—Southern Rhodesia. *Memoirs of the Dept of Agric* No III pp 1-54 With 6 charts 1941 Salisbury Govt Stationery Office

In a previous paper [see this *Bulletin* 1940 Vol. 37 p 400] the author presented a large amount of data on the water content, fat content, temperature relations etc. of *Glossina morsitans* reared in the laboratory. In the present paper he utilizes a long series of observations made by Mr W. L. Williams in order to ascertain how

TRYPANOSOMIASIS

NIGERIA. REPORT ON THE MEDICAL SERVICES FOR YEAR 1940 [BRIDGES CLIFFE (Rupert) Director] Appendix B. pp. 15-16.—Report of the Sleeping Sickness Service, 1940.

In consequence of the war there was only one sleeping sickness team at work during 1940 in the Benue Province but the great reduction in the infection rate in the Northern Provinces has made it possible to stop the surveys. During the year 19,596 new cases were found and about 33 000 new and old, were treated in the Benue Province the infection rate was 9.7 per cent. Areas previously treated now show an infection rate of 1.7 per cent. There is still a high incidence in labourers in the Kabba, Ilorin and Niger goldfields.

Resettlement in the Anchau corridor has progressed and much of it has been made fly free. In parts of the Katsina Emirates 233 miles of clearing near villages, watering places and fords have been completed and the bulk of 128 000 people there should now be safeguarded in their home areas.

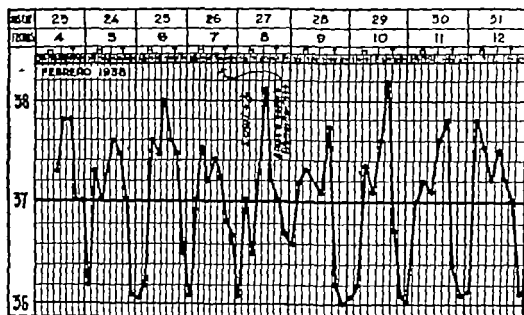
C 17

GIBBINS (E. G.) Studies on the Bionomics, Control and Natural Insectivity of the Riverine *Glossina palpalis* Subspecies *fraxipes* Hewstead in the West Nile District of Uganda.—*Ann Trop Med. & Parasit.* 1941 Dec 31 Vol 35 No 2 pp 195-220 With 5 graphs 1 map 2 figs & 2 plates. [16 refs]

Sleeping sickness is still endemic in the West Nile district of Uganda this paper describes the natural history of *Glossina palpalis* in the area and bases recommendations for control upon an experimental study of the factors influencing the prevalence of the fly. *G. palpalis* is confined to the immediate vicinity of rivers and streams along which it may range for miles, often flying over the open water. Its numbers can be reduced to a safe level of less than two flies per boy-hour by what the author calls 'rod clearings'. These extend only 10 yards in width on either side of the river. But to be effective they must be at least 600 yards in length with the road crossing, or village that it is desired to protect in the middle. Rod clearings are effective only if the grass is kept short when tall grass is allowed to grow they may be more favoured by tsetse than the untouched forest. Tall trees can safely be left provided the branches are cut away up to 15 feet from the ground. Growth on the islands in the rivers must also be kept short.

The factors limiting the fly to the water courses are uncertain humidity has no influence perhaps the food supply in the form of lizards and monitors is important. The effectiveness of the narrow clearings seems to be due to their preventing the fly from lingering along that section of the stream and perhaps exposing it more to the attacks of the large numbers of predaceous dragon flies. Among 2,945 flies examined no gland infections were found, but 10 per cent. of 246 flies showed flagellates in the gut.

V B Wiglesworth.



Part of temperature chart of a patient harbouring *T. cruzi* in the blood.

[Reproduced from *Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy Publicación No 58*]

Bulletin 1941 Vol. 38 p 251) and as Chagas's disease was for a long time believed to be the cause of goitre in certain districts where the latter existed and was later shown to be merely co-existent without aetiological connexion so possibly these cases of Chagas's disease with double peaked temperature chart leishmanial forms in glands etc may be examples of co-existent Chagas's disease and kala azar. The author may have taken measures to eliminate the latter if not further investigations with that end in view will doubtless be undertaken.]

H H S

LEISHMANIASIS

SMITH (R O A) HALDER (K C) & AHMED (I) Further Investigations on the Transmission of Kala-Azar Part IV The Duration of Life and Other Observations on 'Blocked' Flies.—*Indian J Med Res* 1941 Oct. Vol 29 No 4 pp 783-787 With 2 figs.

In previous communications [this *Bulletin* 1941 Vol. 38 p. 256] the authors have described the phenomenon of blockage of the oesophagus of sandflies infected with leishmania. This blockage is of such a nature that the ingestion of blood is impossible, though the flies may make repeated attempts to feed. It seems possible that though blood will not pass the block fluid from raisins may do so for certain blocked flies have survived longer than would be the case if no fluid had been imbibed.

The experiments reported in this paper were commenced in May 1940 and blocked flies were obtained during the succeeding six months. The flies were fed on a patient with kala azar and then kept in an

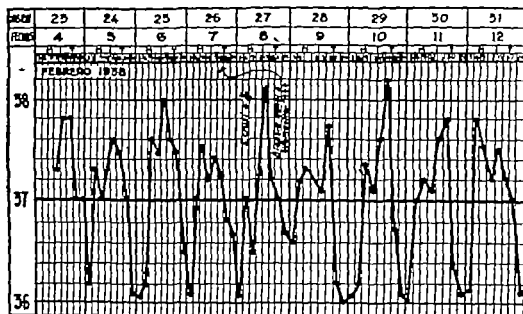
rats. The method of exposing the rats to the bugs and of storing the bugs between feeds is described. Each of the nine species is then considered in detail. Lists are given of the localities in which uninfected individuals and infected ones if any were found. The species found naturally infected with *Trypanosoma cruzi* were *Triatoma protracta* Uhl. *T. protracta woodi* Usinger *T. rubida* Uhl. *T. longipes* and *T. gerstaeckeri* Stål. The numbers of these species taken were 1,211 489 771 152 and 55 respectively the numbers examined were 957 415 230 62 and 54 and the numbers infected 196 20 3 10 and 3. *T. rubida* was referred to in a previous paper as *Eumecurus uhleri* Neiva [which Usinger considers a subspecies of it]. The numbers of the other four species found and usually the number examined are given, and also the numbers of each species found in wood-rat nests, houses, tents etc. and the numbers of adults and small, medium-sized and large nymphs. Notes are included on the bionomics of the bugs. Three females of *Paratriatoma kirszia* Barber were found infected 10 days after feeding on a *Peromyscus* that had been infected by inoculation. There were numerous crithidia in their faecal deposits and 21 days after feeding numerous trypaniform and crithidial stages were demonstrable. A white mouse inoculated with their faeces showed typical *Trypanosoma cruzi* in its blood 14 days later.

MAZIA (Salvador) BASSO (Germinal) & BASSO (Redento). Investigaciones sobre enfermedad de Chagas. Caracteres de la curva térmica en primer período de la enfermedad de Chagas. [Characteristics of the Temperature in the Early Stages of Chagas's Disease.]—*Universidad Buenos Aires. Misión de Estudios de Patología Regional Argentina. Jurey. Publicación No. 58. 1941. 72 pp. With 63 figs. [10 refs.]*

Fever of an intermittent character persists as long as the trypanosome is present in the blood in Chagas's disease, but little attention has hitherto been paid to this feature of the disease. Charts are reproduced in this article showing in most a daily rise to 38°C. or thereabouts—occasionally a point or two higher—more commonly two or three points lower—and a fall to 36.2°–36.4°. Some however show a double peak, even three in 24 hours are reported, but in the intervals between these the drop is only 0.2°–0.4°. the larger fall to below normal occurring between the evening rise of one day and the morning rise of the next. (See part of chart reproduced.)

This intermittent quotidian type of fever with a double peak is strong presumptive evidence of Chagas's disease in countries where this disease is known to occur and brings the condition more into line with visceral leishmaniasis (kala azar) for in Chagas's disease this type of temperature is found to coexist with leishmanial forms invading the tissues.

This article contains more than the title indicates. In addition to several temperature charts it contains photographs of patients showing the characteristic Romana's sign, many photomicrographs of the histological changes and telerradiographs with cardiometric measurements. All of these are excellently reproduced. [Without wishing to detract from the value of the excellent article, perhaps it would be wise to sound a note of warning. Kala azar exists in the Argentine, the senior author of the present paper has himself noted the fact (see this



Part of temperature chart of a patient harbouring *T. cruzi* in the blood

[Reproduced from *Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy Publicación No 53*]

Bulletin 1941 Vol. 38 p 251) and as Chagas's disease was for a long time believed to be the cause of goitre in certain districts where the latter existed and was later shown to be merely co-existent without aetiological connexion so possibly these cases of Chagas's disease with double peaked temperature chart leishmanial forms in glands etc may be examples of co-existent Chagas's disease and kala azar. The author may have taken measures to eliminate the latter if not further investigations with that end in view will doubtless be undertaken.]

H H S

LEISHMANIASIS

SMITH (R O A) HALDER (K C) & AHMED (I) Further Investigations on the Transmission of Kala-Azar Part IV The Duration of Life and Other Observations on 'Blocked' Flies.—*Indian J Med Res* 1941 Oct Vol 29 No 4 pp 783-787 With 2 figs.

In previous communications [this *Bulletin* 1941 Vol. 38 p. 256] the authors have described the phenomenon of blockage of the oesophagus of sandflies infected with leishmania. This blockage is of such a nature that the ingestion of blood is impossible though the flies may make repeated attempts to feed. It seems possible that though blood will not pass the block fluid from raisins may do so for certain blocked flies have survived longer than would be the case if no fluid had been imbibed.

The experiments reported in this paper were commenced in May 1940 and blocked flies were obtained during the succeeding six months. The flies were fed on a patient with kala azar and then kept in an

unregulated incubator with a wet-bulb thermometer registering from 79°F to 87°F. They were supplied with raisins on which to feed for 10 days, when they were offered a second feed of blood on an experimental animal. It was at this feed that the blockage was detected for the flies made repeated attempts to obtain a blood meal. These attempts were repeated each day and usually if a fly did not attempt to feed it was found dead the next day. After having been given a chance of feeding on an animal the flies were tubed with raisins. A comparative experiment was made by giving a batch of flies a feed on a patient with kala azar and then keeping half on a raisins diet and the other half on repeated blood meals. Blocked flies were detected only amongst those fed on raisins after the infective feed.

As regards the survival of blocked flies, of 73 observed, 39 died within 24 hours, 13 within 48 hours, 13 within 72 hours, 6 within 96 hours, and 1 each on the next two days. It is noteworthy that amongst flies that have been found naturally infected few had heavy infections. This may be due to the fact that blocked flies show no sign of having had a blood meal while it has been the practice when capturing flies for dissection to disregard those which have shown no evidence of a blood feed. [See also Part VI of this series below.]

C. M. Wenyon

SMITH (R. O. A.) & ARMED (I.) Further Investigations on the Transmission of Kala-Azar. Part V. An Inquiry into the Relation between Malaria and Kala Azar in a Rural Area.—*Indian J. Med Res* 1941 Oct Vol 29 No 4 pp. 789-797 With 1 graph.

NAPIER and KRISHNAN [this *Bulletin* 1932, Vol. 29 p. 495] have suggested that kala azar may be the result of dissemination of leishmania from a quiescent focus in the skin as a result of typhoid in urban districts or malaria in rural districts, both of which produce reactions in the reticulo-endothelial system with the mobilization of large mononuclears in the blood. It is also stated that malarial parasites are rarely seen in the blood of kala azar patients because of the marked histiocyte proliferation which is a feature of this disease.

As in various parts of Bihar localized epidemics of malaria have been followed by a considerable increase in the incidence of kala azar an opportunity presented itself for studying the connexion between the two diseases. An area was chosen in which an epidemic of malaria commenced in August 1938 and in March 1940 at a treatment centre a record was kept of the cases with malaria and kala azar. A total of 900 patients were examined and of these 234 were diagnosed as kala azar and 257 malaria. Of the 234 cases of kala azar an association with malaria was detected in only 15. In 195 cases kala azar was found already established at the first visit of the patient to the centre. A careful examination of the figures relating to the age incidence, size of spleen and probable duration of the kala azar did not support the view expressed above—though it seems probable that the sudden increase in cases of kala azar was the result of a lowered resistance brought about by malaria. From a practical point of view it is noted that in rural areas where both diseases are prevalent, measures directed against the adult forms of the vectors of malaria and kala azar all of which take shelter in houses, are more likely to produce good results than attempts to attack the larval stages, which are found in totally different environments and are spread over wide areas.

C. M. Wenyon.

SMITH (R. O. A.) HALDER (K. C.) & ARMED (I.) Further Investigations on the Transmission of Kala-Azar Part VI. A Second Series of Transmissions of *L. donovani* by *P. argentipes*—*Indian Jl Med Res* 1941 Oct Vol 29 No 4 pp 799-802

In a previous paper [this *Bulletin* 1941 Vol. 38 p 256] the authors described experiments with sandflies in which a new method of feeding led to blockage of the oesophagus by developing flagellates and the successful transmission of infection by such blocked sandflies. The new method of feeding was the maintenance of the sandflies on a raisin diet after the infective feed on a kala azar patient instead of the repeated blood feeds employed in earlier investigations. As it seemed that the successful results reported in the previous paper may have been due to a peculiar virulence of the strain of leishmania used rather than to the intensive development resulting from the new method of feeding it was decided to test the powers of transmission of sandflies maintained by both methods. Accordingly a batch of sandflies after feeding on a patient with kala azar were divided into two lots one of which was given repeated blood meals and the other the opportunity of feeding on raisins. Ten hamsters were used for the experiment and each was given approximately 10 infective feeds. Five were fed upon by sandflies which had had the raisin diet and all were infected. Of five fed upon by sandflies which had had repeated blood meals four failed to become infected while the fate of one which escaped became unknown. In addition to the experiments with hamsters 16 mice were given a varying number of infective feeds. Of 12 which it was possible to examine later for evidence of infection four were proved to have been infected, but whether by raisin fed flies or not is not stated.

It would seem from these experiments that it was the new method of feeding rather than the virulence of the parasite that was responsible for the successful transmission
C. M. Wenyon

YAO (Y. T.) & WU (C. C.) The Finding of *Phlebotomus chinensis* Newstead from Yunnan and its Bearing on the Transmission of Kala-Azar in South China, with Remarks on the Success in Infecting Chinese Hamsters with Flagellates from Naturally Infected *P. chinensis* found in Tsingkiangpu.—*Chinese Med Jl* 1941 Sept Vol. 60 No 3 pp 232-240 [24 refs.]

In this article the authors discuss the relationship of kala azar in China to *Phlebotomus chinensis* which is shown to be the chief if not the only vector. The sandfly has been recorded chiefly from districts north of the Yangtse river and in these kala azar has been shown to be endemic. South of the river however the close association of this sandfly with kala azar has yet to be demonstrated. The sandfly has been collected in the Province of Yunnan and on the island of Hainan, where kala azar has not yet been found, while cases of the disease have been identified in Chekiang Kiangsu, Kiangsi Kwangsi, and Kwangtung where *P. chinensis* has not yet been seen. So close however is the relationship of this sandfly to kala azar in N. China that it can be confidently expected that where the sandfly occurs in S. China there kala azar will ultimately be found to occur and that where kala azar has been recognized the sandfly will sooner or later be discovered.

It is noted that in a batch of *P. chinensis* collected in a village in Tsingkiangpu an endemic centre of kala azar north of the Yangtse,

10 were found to be infected with leptomomads. The flagellates from six of these were injected intraperitoneally to 11 Chinese hamsters four of which acquired a visceral leishmania infection.

C M Wernon.

KIKUTH (Walter) & SCHMIDT (Hans) Chemotherapeutische Untersuchungen mit Neostibosan und Solustibosan bei mit Leishmanien infizierten Hamstern. [Neostibosan and Solustibosan in Leishmania-infected Hamsters.]—*Ztschr f Immunitätsf u Experim. Therap* 1941 Aug 12. Vol. 100 No 3 pp 157-178.

In an earlier publication [this *Bulletin* 1938, Vol. 35 p 870] the authors gave an account of experiments with neostibosan and solustibosan in the treatment of European hamsters experimentally infected with *Leishmania donovani*. They showed that bi-weekly doses of neostibosan for five weeks (10 doses in all) had a greater curative effect than the solustibosan administered in the same way and in doses giving an equal quantity of antimony. When the course was shortened and 12 doses given in two weeks solustibosan gave better results than neostibosan. With a still shorter course of eight doses in eight days, it appeared that a smaller quantity of antimony in the form of solustibosan gave the same result as larger quantities in the form of neostibosan.

These results were not confirmed by WANG [this *Bulletin* 1939 Vol. 36 p 452] who carried out experiments with infected Chinese hamsters. He found that in daily doses neostibosan gave better results than solustibosan, and that more antimony in the form of solustibosan was required to bring about cure.

With a view to throwing light on the question the authors carried out a further series of experiments which are described in the present paper. In the first place 15 infected hamsters were treated with 10 daily doses of neostibosan (500 mgm per kilogram of body weight) and a like series with 10 daily doses of solustibosan in the same amount. The animals were killed and examined for infection at intervals up to six months after treatment. Two of the solustibosan-treated animals were found infected when killed but none of those treated with neostibosan, though one of them was shown to be still infected at an earlier date when liver puncture was performed. It is pointed out that in the neostibosan series each animal received 2,100 mgm. of antimony whereas in the solustibosan series each animal received only 1,350 mgm. of antimony. This experiment indicated that in the doses employed a 10-day course of either drug was almost sure to eradicate an infection. In another experiment some animals were treated with the same daily doses of the two drugs for 10 days, and others with bi-weekly doses during five weeks. All the solustibosan-treated animals were cured, as also were those treated with bi-weekly doses of neostibosan. Of six which received 10 daily doses of neostibosan three were found infected when examined, a result which at first sight does not appear to agree with those of the first experiment. When the experiments were carried out with doses of 300 mgm. and 200 mgm. instead of the 500 mgm. the failures were equal for the two drugs and no distinction could be drawn between them. The claim of WANG that bi-weekly doses gave better results than daily doses was not confirmed.

The general conclusion is that in the form of solustibosan a smaller quantity of antimony gives the same result as the same quantity of

neostibosan which contains a larger amount of antimony that solustibosan is better tolerated by the animals and in intensive treatment gives at least as good results as neostibosan C M Wenyon

ADLER (S) & BER (M) The Transmission of *Leishmania tropica* by the Bite of *Phlebotomus papatasi*—*Indian Jl Med Res* 1941 Oct. Vol. 29 No 4 pp 803-809 With 3 figs. on 1 plate

In this paper the author describes transmission experiments in which he employed laboratory-bred sandflies (*Phlebotomus papatasi*) infected with *Leishmania tropica* by feeding through a membrane on a suspension of washed flagellates in a mixture of three parts of 2.7 per cent saline and one part of inactivated defibrinated rabbit blood. After feeding the sandflies were kept in an incubator at 30°C. in test tubes plugged with slightly moistened cotton wool. They were taken out from time to time and fed on an individual who had recovered from oriental sore. Finally feeds on susceptible volunteers were undertaken. A large number of transmissions were effected as shown in the following table—

Table showing the results of feeding on five volunteers

Volunteer number	Number of infected sandflies fed	Total number of individual feeds	Total number of lesions produced
1	2	2	1
2	9	11	18
3	5	14	6
4	15	17	1
5	3	3	2

N.B.—The number of individual bites is considerably greater than the number of individual feeds.

It is pointed out that in these experiments transmission was accomplished with almost ridiculous ease as compared with previous attempts. Thus as recorded in an earlier paper by ADLER and THEODOR [this *Bulletin* 1929 Vol 26 p 748] 253 infected sandflies were re-fed repeatedly on 12 volunteers and a puppy. One volunteer developed oriental sore on a site on which sandflies had fed but the experiment was regarded as inconclusive as the individual had resided during the experiment in a locality where a number of cases of oriental sore had been detected. Other (unrecorded) unsuccessful experiments were carried out subsequently. Observations on the development of *L. infantum* in *P. perniciosus* showed that flagellates were deposited by sandflies into any medium on which they fed if the distal part of the epipharynx were infected. It remains to be determined therefore what are the conditions necessary to bring about infection of the epipharynx. The successful experiments reported in this paper differed from previous unsuccessful ones in that the sandflies were kept at a uniform temperature of 30°C. and imbibed a suspension of flagellates in a fluid with a higher salt content. Whether these factors are responsible for the successful results cannot be stated at present.

A significant observation was made near the Dead Sea where in a recent settlement 90 out of 120 settlers contracted oriental sore in

nine months. There the soil has a high salinity level, which must have an influence on the larval stages of the sandfly. In the more northern parts of the valley where the salinity is lower oriental sore is rarely met with.

C. M. Wemyss

FEVERS OF THE TYPHUS GROUP

GROOT (Hernando) Investigaciones con el virus del tifo exantemático en Nariño [Investigation of the Virus of Typhus Fever in Nariño (Colombia).]—*Rev. Facul. de Med. Bogotá* 1941 Oct. Vol. 10 No. 4 pp. 321-324

The virus of this disease, of which twenty cases have already been described by the author and his colleagues, has now been investigated. It has been found to be non-orchitic and to correspond with the virus of classical (louse-borne) typhus fever.

Among 150 guinea-pigs only one showed a slight and fleeting orchitic reaction. The incubation period in animals of the first passage was usually from 12 to 18 days. In one case it was only six days. The virus died out after seven consecutive passages in guinea-pigs. Suspensions made from lice collected from a patient in the acute stage of the disease were infective to guinea-pigs.

John W. D. McGraw

MINK (W.) Kurze Bemerkung zu Versuchen der Eubasinumbehandlung bei Flecktyphus. [The Treatment of Typhus with Sulphapyridine.]—*Klin. Woch.* 1942. Feb. 21. Vol. 21. No. 8. p. 185

Sulphapyridine has been used in the treatment of typhus in Warsaw since early 1940 especially in relation to the complications of which the most common and dangerous is pneumonia due to secondary bacterial invasion. On the whole the results have been favourable, and the impression has been gained that the drug tends to prevent pneumonia, but there is no evidence that sulphonamides influence typhus itself. Of 24 sulphonamide preparations tested, WOTLIKAS found only one, 4-sulphonamide-2,4-diamino-azobenzyl-6-carbonic acid, to have any effect on infection of mice with *Rickettsia mooseri* and TORRING (this *Bulletin* 1940 Vol. 37 p. 264) reported adversely on protosil and sulphapyridine in experimental Rocky Mountain fever and endemic typhus in guinea-pigs. These results support the view that sulphonamides are not useful in uncomplicated typhus.

The author makes reference to encouraging reports given by MÜLLERS on treatment with Novasurol, and by GIUNTA and D'IGNAZIO in Abyssinia with mercurochrome and vitamins B₁ and C [this *Bulletin* 1939 Vol. 36 p. 689 1940 Vol. 37 p. 257].

C. H.

MAGALHÃES (O.) & ROCHA (A.) Tifo exantemático do Brasil (em Minas Gerais). Estudos em focos da moléstia—Moléstia inaparente, benigna e grave. [Exanthematic Typhus (Tiek-borne) of Brazil (in Minas Gerais).]—*Brasil-Médico* 1941 Nov. 22. Vol. 53. No. 47 pp. 773-777

Cases are described which illustrate three types of the exanthematic typhus of Brazil. These are (1) Typical severe attacks, (2) Benign

forms with fever and strongly positive Weil-Felix reactions and (3) Inapparent forms without fever or other symptoms but with demonstrable virus.

The authors are convinced that there are several distinct strains of the virus each strain retains its special characteristics after a series of transfers through experimental animals and fails to protect animals from infection with other strains. Another possible explanation of this failure to protect is that the immunity resulting from infection with any given strain is only partial and temporary. One or other of these two hypotheses would explain the occurrence of severe and even fatal attacks in persons who have lived for many years in areas of high endemicity and who therefore, can hardly have escaped from previous attacks.

John W D Megaw

TOSTES (José) & BRETZ (Germano) Sobre uma Rickettsiose observada em zona rural do estado do Rio de Janeiro [Tick borne Rickettsial Fever in a Rural Area in the State of Rio de Janeiro.]—*Brasil-Médico* 1941 Nov 29 Vol. 55 No 48 pp 789-794 With 4 figs & 1 map [20 refs.] English summary

Exanthematic typhus of the Rocky Mountain spotted fever type has already been reported from São Paulo and Minas Geraes in Brazil fourteen cases have now been reported from a rural area in the adjoining State of Rio de Janeiro. Six of these cases were studied in five there was a positive agglutination of *Proteus OX19* in the highest titre tested (1-800) in the case of the patient whose reaction was negative the virus was recovered from inoculated guinea-pigs. In five of the cases guinea-pigs reacted to blood inoculations in the manner typical of Rocky Mountain spotted fever. Scrotal reactions were frequent and Rickettsiae were usually found. Ticks from infected localities were examined but no virus was detected. Four of the six patients died.

John W D Megaw

-YER (R. E.) Mass Immunization against Typhus Fever.—*Ann Intern Med* 1941 Oct Vol 15 No 4 pp 629-636 [28 refs.]

This is yet another critical survey of the methods of immunization against typhus fever which are likely to be useful on a large scale. Typhus fever is referred to in the paper as a disease transmitted in nature from rat to man by fleas and from man to man by lice. No mention is made of the related diseases conveyed from animals to man by ticks and mites. It is theoretically possible that flea borne typhus may become epidemic through the agency of the body louse but such an event apparently has not occurred in the U.S.A. where the prevention of the flea borne disease is chiefly a matter of rat control. [It appears to have occurred in Mexico and Shanghai see this *Bulletin* 1939 Vol 38 p 994 1940 Vol 37 p 256]

The methods of immunization by living virus are described the chief of these are the procedures associated with the names of Laigret and Blanc both of which involve the use of murine (flea borne) virus. Although these appear to confer immunity when their use is followed by an attack of the disease they may give rise to severe reactions in Europeans and they are not recommended if some safer vaccine can be found.

Of the methods in which killed virus is used Weigl's vaccine is the oldest but it is too cumbersome for large-scale production. The killed vaccines of Cox and Castaneda can be produced in quantity and, from available results in animals, give promise of producing immunity in man. Experimentally Castaneda's vaccine has been shown to protect man against subsequent inoculation with infective material.

Final judgment on the values of the latter two vaccines cannot be passed till they have been tried under controlled conditions in epidemics. The Cox vaccine is now on trial in Rumania, Hungary, Spain and China.

A brief outline of the most recent methods of preparing the above vaccines is as follows—Lalret and Durand now use the brain substance of mice infected with murine virus this is mixed with egg yolk and dried. Stored at low temperatures it remains infective for three months. The preparation is suspended in olive oil for a short time before use. Blanc and Baltazar now use the dried excreta of fleas infected with murine typhus these remain infective for two years. Suspensions are made and ox bile is added to the extent of five per cent. of the volume 15 minutes before use. Weigl's killed vaccine is prepared by inoculating lice per rectum with suspensions of *Rickettsia prowazeki* the insects are then fed on immune persons for several days, their intestines are dissected out and triturated in carbolyzed saline. About 100 lice are needed to provide vaccine for each person. Cox incubates fertile eggs for six or seven days, injects the virus into the yolk sac and incubates the eggs till the death of the embryo which usually occurs within five to seven days. The tissues are washed in saline and ground with alundum. The mixture is made up to a ten per cent suspension of saline containing formalin." [See this Bulletin 1942, Vol. 39 p 381]

A vaccine prepared in this way with *R. prowazeki* protects guinea pigs against the homologous strain.

Castaneda has shown that the *R. mooseri* of flea-borne typhus can be obtained in large numbers from the lungs of rats and mice inoculated by the intranasal route and that formalized suspensions of these organisms protect guinea pigs and human volunteers against infection with the same strains. Durand and Girod have shown that vaccines made from *R. prowazeki* can be prepared in the same way.

John W. D. Megaw

CORRECTION.

The following note has been received from Sir John Megaw

"In my comment on the paper by BUCHWALD this Bulletin 1942, Vol 39 p 137 I suggested the need for an investigation into the possibility of non-specific rises in the titre of the Weil-Felix reaction in cases of non-rickettsial fevers in which the sera of the patients already reacted in dilutions of 1-25

"It has been brought to my notice that A. FELIX has already investigated this question. In a paper in the *Journal of Hygiene* 1929 pages 434 to 445 he gave a number of examples of cases of typhoid and other non-rickettsial diseases in which Weil Felix titres ranging from 1-50 to 1-200 remained constant during periods of observation which extended, in some patients, over several weeks.

"It is regretted that these important findings were not known to me."

YELLOW FEVER.

HUGHES (T P) JACOBS (H R) & BURKE (A W) *A Survey of Yellow Fever Immunity in Uganda.*—*Trans Roy Soc Trop Med & Hyg* 1941 Nov 29 Vol 35 No 3 pp 131-142 With 2 maps [11 refs.]

The report of a survey undertaken by members of the Rockefeller Foundation with the co-operation of the Uganda Government to determine a more precise delimitation of the zone of yellow fever immunization in the Uganda Protectorate and the neighbouring territories

The results of testing 3941 specimens from 49 different localities in the Uganda Protectorate are shown on a map and also given in tabular form. The eastern central and south western regions show no evidence of previous or present infection with yellow fever *no immunity being found among children up to 14 years old*, and only in rare isolated cases among adults. In the northern region an appreciable degree of immunity was found among children and adults which however may be a reflection of travel into infected areas or of isolated infections.

In western Uganda sera were collected from Bunyoro and Toro Districts. The former showed an immunization rate of 1.7 per cent in children and 2.4 per cent in adults. In Bwamba county Toro District, bordering the Belgian Congo 109 out of 1,231 sera were positive a percentage of 8.9 but the sera from those regions bordering the Ituri Forest gave an immunization rate of 22.6 per cent. This suggests the existence of a continuing yellow fever infection, possibly endemic in character but even in this area extensive investigation over a period of three years has failed to reveal an active case of the disease

E Hindle

FINDLAY (G M) KIRK (R) & MACCALLUM (F O) *Yellow Fever and the Anglo-Egyptian Sudan. Distribution of Immune Bodies to Yellow Fever.*—*Ann Trop Med & Parasit* 1941 Dec 31 Vol 35 No 2 pp 121-139 With 2 maps [15 refs.]

A detailed account of the distribution of yellow fever immunity in man and animals in the Anglo-Egyptian Sudan based mainly on the results of mouse protection tests carried out respectively in the Nuba Mountains 1935-1938 in the Fung area 1937-1938 and a general survey in 1941

The results are given in tabular form and also on maps and should be consulted in the original by those interested. During 1941 positive protection tests were obtained with sera collected from Rahad in Kordofan two towns in the Equatorial Province and Umm Beremberta in the Nuba Mountains. In each case only one serum was positive. The presence of two infected towns in the Equatorial Province adjoining Abyssinia suggests the possibility that the disease had extended into that country. As a result of this and previous surveys the yellow fever endemic area is found to comprise a region bordered on the north by the southern edge of the Sahara from Genema to El Fasher in Darfur the border then dips southwards through the southern two-thirds of the Nuba Mountains crosses the White Nile

between Kaka and Jebelain and proceeds through Dar Fung to the Abyssinian border. It is probable that in this region the endemic area extends at least as far as the edge of the Abyssinian plateau. On the south and west the Sudanese endemic area merges with those of Uganda, the Belgian Congo and French West Africa.

Positive reactions have also been obtained with the sera of primates and certain domestic animals in the Sudan. In the Nuba Mountains, 4 out of 16 cows, 2 of 3 dogs, and 3 of 8 pigs were positive and 3 goats, 4 sheep and 6 hens negative.

The true significance of the results in domestic animals is still obscure for positive reactions have been obtained in non-endemic yellow fever areas.

E. Hindle

MAHAFFY (A. F.) HUGHES (T. P.) SMITHBURN (K. C.) & KIRK (R.)
The Isolation of Yellow Fever Virus in the Anglo-Egyptian Sudan.—
Ann. Trop. Med. & Parasit. 1941 Dec. 31 Vol. 35. No. 2.
pp 141-148.

An account of the isolation of two strains of yellow fever virus from patients in the Nuba Mountains, who both suffered a mild attack of the disease.

The blood was collected from the patients by a vacuum venule and 0.03 cc. of the serum injected intracerebrally into each of a group of 5 or 6 white mice. The pathogenic properties of the two strains obtained were studied in mice and rhesus monkeys. Out of 17 monkeys, 6 died with typical lesions and 11 survived and became immune. The two strains of virus were found to be identical with strains isolated in other parts of the world.

E. Hindle

MARSHALL (F.) Die histologischen Leberveränderungen bei experimentellem Rift Valley Fieber und ihre Beziehungen zur Gelbfieberpathologie [The Histological Changes of the Liver in Experimental Rift Valley Fever and their Relationship to the Pathology of Yellow Fever]—*Arquivos do Inst. Biol. São Paulo* 1940 Vol 11 pp 215-220

A general discussion of the pathology of Rift Valley fever with special reference to its relationship to yellow fever.

The author calls attention to the changes in the liver of mice and hamsters infected with Rift Valley fever in which marked congestion of the capillaries occurs and red cells occupy lacunae in the liver cells. The presence of these erythrocytes, however, is not the result of primary haemorrhage but only secondary following upon cell necrosis.

There are striking similarities to the pathology of yellow fever. The Councilman bodies resulting from scattered necrosis may dominate the picture in both infections and the intra-nuclear inclusions are also similar. The two infections also resemble each other in the size of the virus particles and general biological features.

In spite of these similarities however there is little danger of the diagnosis of yellow fever being complicated during the examination of specimens of liver obtained by viscerotomy since Rift Valley fever has a very restricted distribution and in man produces only a mild infection.

E. Hindle

KIRK (R.) CAMPBELL (R. T.) & CHARLTON (R.) Yellow Fever Infection as observed in Europeans in the Nuba Mountains, Anglo-Egyptian Sudan.—*Ann Trop Med & Parasit* 1941 Dec 31 Vol 35 No 2. pp 113-120 With 2 charts [10 refs.]

A record of five cases of yellow fever among Europeans in the Nuba Mountains district of the Anglo-Egyptian Sudan and clinical descriptions of three of them

All these cases ended in recovery and in this district there are no records of Europeans having died from an illness resembling yellow fever. This supports the observation that mild cases of the disease may occur under natural conditions for three of the above were acquired during the course of an epidemic in which fatal cases occurred among Africans.

E Handle

FINDLAY (G. M.) KIRK (R.) & LEWIS (D. J.) Yellow Fever and the Anglo-Egyptian Sudan the Differential Diagnosis of Yellow Fever.—*Ann Trop Med & Parasit* 1941 Dec. 31 Vol. 35 No 2. pp 149-168. With 1 map & 2 plates [33 refs.]

The difficulty in diagnosing yellow fever in the field by clinical means is well illustrated by the present account of two epidemics not of yellow fever but associated with jaundice and black vomit, occurring during 1940 in the Tagoi Hills and in and around El Obeld, at the same time as yellow fever was present in other parts of the Province of Kordofan

The clinical symptoms of the two epidemics are based on 33 cases three of which were fatal. The following is a summary of the principal symptoms of these 33 patients studied in detail —

Fever 33	Epistaxis 11
Headache 33	Vomiting 11
Jaundice early 10	Black vomit 3
late 15 } 25	Haemorrhage from bowels 4
Backache 20	Residual enlargement of liver 4
Pains in limbs 18	Epigastric pains 2
Diarrhoea 12	

The urine contained albumen in addition to bile. Differential blood counts showed polymorphonuclear leucocytosis. No malaria parasites were found, but in two patients whose blood was examined at the height of the fever spirochaetes were present

Careful experimental investigations excluded the possibility of yellow fever and after a discussion of all the possibilities the authors bring forward evidence to show that relapsing fever and infective hepatitis in addition to yellow fever were present in epidemic form in Kordofan Province during 1940

In view of the various diseases in the tropics that may produce jaundice accompanied by black vomit it is obvious that laboratory procedures are essential for the rapid and accurate diagnosis of yellow fever and in countries where it exists or may spread, laboratories should be equipped to carry out the isolation of the virus by inoculation into susceptible animals the histological investigation of liver sections from fatal cases, and mouse protection tests on the blood

E/Handle.

HARGETT (M. V.) Les moustiques dans les aéronefs. [Mosquitoes in Aircraft].—*Bull. Office Internat. d'Hyg. Publique* 1941 May-June. Vol. 33 No. 5-6 pp 279-287 [15 refs.]

The prevention of the carriage of mosquitoes by aircraft is important in America because of the existence of yellow fever in South America and the presence of *Anopheles gambiae* in a restricted region in Brazil. In this paper the author reviews the various methods of destroying mosquitoes in aircraft, methods of screening, the relative advantages of spraying aircraft before, during and after flight and he describes the methods that have been used in recent years on the routes from South America to Miami (Florida) and the results of inspections of aircraft on arrival at Miami. The insecticide used is an extract of pyrethrum in deobase oil (with a flash point of 79°C) with which there is no danger of fire, containing 0.4 per cent. of total pyrethrins. This is atomized at the rate of 20 cc. per 1 000 cubic feet while the aircraft is in flight. Ventilators are closed, cupboards, drawers, holds of baggage etc. are opened and remain so for at least five minutes after atomization is completed. Where spraying is carried out on the ground, better results can be obtained by the use of heavier power-driven spraying apparatus. If experienced fumigators are available hydrogen cyanide at the rate of 6 ounces per 1 000 cubic feet may be employed for vacant aircraft. Inspection of 368 aircraft on arrival at Miami from regions south of Cuba during 1938 resulted in the discovery of five living mosquitoes which had survived the standard pyrethrum spraying in five different aircraft.

V. B. Wigglesworth

CHOLERA.

BENGAL PUBLIC HEALTH REPORT FOR YEAR 1939 [CHATTERJI (A. C.) Director] pp 35-47 With 6 figs (2 maps) —[Cholera.]

Cholera incidence definitely receded in 1939 as is shown by the 33,221 deaths of that year against 71 133 deaths in 1938. These totals represent death rates of 0.7 and 1.4 per mille respectively. Preventive measures have been mainly inoculation and disinfection for the active disease. Improvement of rural water supplies is taken to be the most important of permanent anticholera measures. It is very necessary that in making schemes for water supply attention should be paid to the simultaneous adoption of drainage schemes to obviate the risk of the stagnation of waste water providing fresh causes of malaria and water-borne diseases.

W. F. Harvey

VENKATRAMAN (K. V.) & RAMAKRISHNAN (C. S.) A Preserving Medium for the Transmission of Specimens for the Isolation of *Vibrio cholerae* —*Indian J. Med. Res.* 1941 Oct. Vol. 29 No. 4 pp. 661-664

The sending of stools to a district laboratory for such an essential diagnosis as cholera is a difficult matter because the cholera vibrio is apt to die out during transit. Various methods have been tried

out to get over the difficulty. That which is proposed here and which has been tried in the field is the use of a buffered sea salt solution as a preserving medium. The solution is prepared as follows —

12.405 g boric acid and 14.912 g potassium chloride are dissolved in about 800 cc of hot distilled water the solution cooled and made up to 1 litre. From this stock solution 250 cc. are taken, mixed with 133.5 cc of N/5 NaOH and the whole made up to a litre. Twenty grammes dried sea-salt (common salt from the bazaar serves equally well) are dissolved and the buffered saline filtered through paper dispensed in 10 cc. quantities in 1-oz. screw-capped bottles and sterilized in the autoclave. The sterilized buffer has a pH of 9.2 and is found to maintain the same pH for months.

In use a spoonful (1-3 gm) of stool is well mixed in the buffered solution and despatched to the laboratory by post.

Satisfactory trials were made with artificially infected stool from which specimens were daily enriched in Read's mannose-bismuth sulphite modification [this *Bulletin* 1939 Vol 36 p 894] of Wilson and Blair's medium and then plated. Vibrios were found to remain viable for as long as 62 days. In a trial of samples from a proved case of cholera isolation of *V. cholerae* was effected up to 92 days after collection when the specimens were exhausted. A field trial was instituted sixty-six specimens including a specimen of vomit were taken from 60 cases. *V. cholerae* was isolated from 64 specimens in the field and from 60 in the laboratory. *W F Harvey*

- i. TOMB (J Walker) Collapse and Renal Failure.—*Med Jl Australia* 1941 Nov 15 28th Year Vol. 2. No 20 pp 569-570 [14 refs.]
- ii. MEDICAL JOURNAL OF AUSTRALIA. 1941 Nov 15 28th Year Vol. 2 No 20 p 573—The Crush Syndrome.

i The author quotes various authorities to support the view that the essential factor in the development of the late effects of shock (such as are observed in crush injuries) is renal failure due to lack of oxygen supply to the renal tubules which after a time becomes irremediable. A similar condition has long been observed in cholera in which anuria may persist after successful restoration of the circulation by saline infusions. Here again there is irreparable damage to capillary and tubular epithelium due to lack of oxygen consequent upon the state of shock produced by the disease. He argues that the treatment of collapse of the circulation from any cause should include the free and uninterrupted exhibition of oxygen.

ii. In the editorial are presented the two theories of the causation of renal failure in crush injuries first that it may be due to dehydration from loss of fluid to the injured limb and should therefore be treated by replacement methods and intermittent pressure on the injured limbs and second that it may be due to haemolysis from the release of a tissue haemolysin by the injury with the accumulation of acid haematin in the renal tubules and should therefore be treated with intravenous salines and with alkalis *per os*. *C W*

- CHOPRA (R N) DEMONTE (A. J H) & CHATTERJI (B C) Sulphanilylguanidine in Cholera.—*Indian Med Gaz* 1941 Dec Vol 76 No 12. pp 712-713

Sulphanilylguanidine sulphaguanidine for short is a sulphonamide derivative distinguished from allied compounds by reason of its solubility in water and low absorbability from the gastrointestinal

tract " It has been used with good effect in dysentery The mortality in a series of 218 cholera patients receiving 1 gm. initial dose and maintenance doses of 0.5 gm. every 6 hours for 72 hours was 3.21 per cent. as against one of 6.38 per cent. in 94 controls receiving saline perfusion only In the present cholera trials the dosage used was low and further improvement might be obtained by increasing the dose. The control series is not a perfect one inasmuch as 20 clinically positive cases showed no mortality at all. When however the figures are taken for culturally positive cases the percentages for 54 sulphaguanidine patients and 67 saline perfused patients were 3.70 and 8.97 respectively The drug was not found to be toxic to human beings in the doses used sulphaguanidine-treated cases passed fewer stools per day and required less intravenous saline W. F. Harvey

YAWS.

NÁJERA ANGULO (Luis) Sobre un caso de gundu en la Guinea Española [A Case of Goundon in Spanish Guinea].—*Rev. Med. Trop. y Parasit.* Habana 1941 May-June. Vol. 7 No. 3 pp. 54-56 With 1 fig.

Judging from statements in text-books we would regard goundon as fairly common especially in West Africa, and it has been recorded in East Africa, Malaya, Java, Sumatra, China and the West Indies. It comes as a surprise therefore to find the author commenting on its extraordinary rarity in Fernando Po. He quotes BOTREAU-ROUSSEL and CLERC as saying that they saw only one case among 10,000 examined, and he personally seems to have seen only this one among 16,000.

The patient was a man of 20 years who had been working in Fernando Po for 10 months. He came to hospital suffering from trypanosomiasis, but when first coming under observation the goundon was apparent. He was cured of his trypanosome infection in Santa Isabel, but the goundon was unaffected in spite of the administration of arsenicals. The question of its relation to yaws is debated H. H. S.

GUTIERREZ (P. D.) NAVARRO (R. J.) MORALES (S. B.) LOZAKO (A. A.) & GOMEZ (F. B.) Wassermann Reaction of the Cerebrospinal Fluid in Yaws.—*Acta Med. Philippina* 1941 July-Sept. Vol. 3 No. 1 pp. 1-19 With 3 figs.

From time to time a few investigations have been made in regard to possible pathological changes in the cerebrospinal fluid in cases of yaws. One hundred and forty-five cases of yaws treated at the Philippine General Hospital were specially selected to exclude syphilis. In none was the W.R. with the c.s.f. positive the cell count in all 122 cases examined was normal the Pandy test was slightly positive in one of 116 cases examined total protein was normal in 53 cases in which estimations were made the colloidal gold test was similarly negative in 29 cases tested. The total 145 comprised two cases of primary 42 secondary and 101 tertiary yaws.

[It would have been more interesting had there been a much larger group of earlier cases and had the c.s.f. been examined at intervals as there is some evidence that a temporary reaction in the c.s.f. may occur]

H S Stannus

LEPROSY

- i. GREVAL (S D S) CHANDRA (S N) & DAS (B C) A Note on Complement-Fixation Test in Leprosy and Kala-Azar with Witebsky, Klingenstein and Kuhn (W.K.K.) Antigen—*Indian Med Gaz* 1941 Aug Vol 76 No 8. pp 474-475
- ii. — Lesser Knowledge of Human Tubercle Bacillus Serological Affinity with Allergic States, Variation in Content, etc.—*Ibid* 1941 Oct. Vol 76 No 10 pp 610-611 [19 refs]
- iii. LOWE (John) A Note on Complement-Fixation Test in Leprosy and Kala-Azar with Witebsky, Klingenstein and Kuhn (W.K.K.) Antigen. [Correspondence.]—*Ibid* pp 637-638.

i. The authors have tested the reactions with Witebsky Klingenstein and Kuhn antigen in leprosy and kala azar. The antigen used is essentially a solution in benzol of the alcohol insoluble, pyridin-soluble and acetone-insoluble fraction of the human tubercle bacillus. The residue, after evaporation of the benzol is suspended in normal saline and standardized. The essential features are that the dose of the antigen is linked to the haemolytic system and is not complementary and that the reaction is linked to the Wassermann reaction and is put up only when a complement of optimal reaction and titre for the latter reaction is available. The Wassermann reaction is put up at the same time with the same relationship between the serum dilution, the antigen and the haemolytic system. A 1 in 25 dilution is now used in both leprosy and kala azar. Positive reactions are clear-cut and are obtained in early cases of nodular leprosy and also in early kala azar before the formalin test is positive. In neural leprosy the aid given is not of a high order.

ii. This paper covers much the same ground as that above. The author emphasizes the point that the test gives stronger reactions in kala azar than it does in leprosy. The degree of fixation of complement in kala azar is comparable with that obtained in the Wassermann reaction in secondary syphilis. In preparing the WKK antigen from tubercle bacilli cultivated by A. C. UGIL in India, the fraction obtained appears to be two to three times as great as that obtained from bacilli found in Europe. The author raises various points for further investigations and concludes that the auto-antibodies formed in tuberculosis, leprosy, kala azar and syphilis show associations close and remote.

iii. Lowe disputes the claim made in Greval's earlier paper that the serum test is a better and safer test for kala azar and leprosy than others in use. Tests made by Lowe and his colleagues of W.K.K. antigen in leprosy gave very different results from those of Greval; they indicate that this antigen is of very little use in the diagnosis, prognosis and epidemiology of leprosy.

L. Rogers

PALDROK (A.) Results of Specific Therapy of Leprosy in Estonia during Last Twenty Years.—*Acta Med Scandinavica*. 1941 Aug 26. Vol. 108. p 374. [Summary taken from *JL Amer Med Assoc*. 1942 Jan. 3. Vol. 118. No 1 pp 89-90]

Paldrok observed that the causal organism of leprosy consists of granules that are surrounded by an envelop—five or more are generally in one sheath. The common envelop creates the appearance of a rod which Arander Hansen had designated as the bacillus of leprosy. Paldrok observed, however, that the multiplication of these rods is not like that of bacilli but that the granules adhere to the wall, then penetrate the envelop and develop into dendritic forms as do fungi. He became convinced that the causal organism of leprosy is not a bacillus but rather a fungus and that this explains why the leprosy organism does not grow in cultures suitable for bacilli. He found also that the granules and the covering differ in their chemical composition. Whereas the granules contain free nucleic acid, the envelop contains nucleoproteins. Searching for a substance that would destroy the covering, so that the granules could be reached, he decided to utilize the action of cold in the form of solid carbon dioxide. Rods of solid carbon dioxide are pressed against the leproma for three to four seconds. Lepromas of millet seed size completely disappear about three weeks after the freezing but with larger ones the freezing must be repeated. At each session fifteen to twenty lepromas are frozen, and the procedure is repeated every two weeks. After four months, the treatment is interrupted for the same length of time. The decomposition products released during freezing are absorbed by the organism and cause the formation of antibodies. There are indications that the solid carbon dioxide treatment is an autoimmunization. The favorable effect of solid carbon dioxide on leprosy has been corroborated by investigators of many different countries. If after two years of treatment with solid carbon dioxide the organism has lost its responsiveness to the substance a new chemotherapeutic stimulus must be employed, and the author found the organic gold preparation solganal effective. In the course of treatment with solganal the organism regains its responsiveness to solid carbon dioxide so that the two treatments can be used alternately. Good food, a hygienic mode of life, adequate exercise and weekly sweat baths are complementary measures. Those who are apparently cured are kept in the leprosarium for an additional two years. For the first five years after discharge the patients must submit to control examinations every six months. After pointing out that non-specific shock therapy has largely failed in leprosy the author says that the efficacy of the solid carbon dioxide and gold (solganal) treatment is proved by the fact that, whereas in 1920 the total number of patients with leprosy in Estonia was 316 by 1940 there were only 113.

ARAUJO (H. C. de Souza) A anatoxina difterica na lepra [Diphtheria Toxoid in Leprosy].—*Brasil-Medico*. 1941 Nov 8 Vol. 55 No. 43 pp. 750-751

Dr Collier having reported to Dr Muir that he had obtained unexpectedly good results in leprosy from the intramuscular injection of diphtheria anatoxin in doses of 0.5 cc. every two weeks, increasing by the same amount to a maximum of 2 cc., Dr Muir requested the author to make trial of it in lepers in Brazil. He in turn passed on

the request together with a supply of anatoxin to Dr José Maranno at Belo Horizonte. The anatoxin had been prepared at the Oswaldo Cruz Institute some more was obtained from the Institute at Butantão in February 1942. Dr Maranno [the name is spelt with one n or two impartially in this article] reported on three patients with lepromata who had undergone anatoxin treatment for 6 months (1) With many bacteria in the nasal secretion and in the ear lobules showed no organisms after three series of ten injections (2) Similar but apparently more advanced—marked reduction in bacteria and general condition much improved (3) Nasal bacteria lobules affected and cutaneous infiltrations—much improved, fewer bacteria.

Reference is next made to the wonderful results claimed by COLLIER for this form of treatment [this *Bulletin* 1941 Vol. 38 p 704]. The author then gives brief notes of eleven patients of ages ranging between 25 and 55 years and refers to 21 others who were given the anatoxin together with intradermal infiltration of Chaulmoethyl (? Chaulmoethyl). There is no need to detail each of these the results are not very good and the author concludes that at his hospital he could not confirm the good reports from the use of diphtheria anatoxin. The cutaneous symptoms showed little improvement and in some cases became worse after 6 to 13 months treatment with chaulmoogra and physiotherapy. The neuritis is ameliorated by anatoxin but vitamin B₁₂ is equally efficacious. He adds that as the request has been made by Dr Muir the trials with anatoxin will be continued [See also this *Bulletin* 1942 Vol. 39 p 231]

H H S

HELMINTHIASIS

EGAN (E) Hookworm Ora Simple Flotation Technique.—*J Malaya Branch Brit Med Assoc* 1941 June Vol. 5 No 1 p 55 With 1 fig

The faeces container is cylindrical $\frac{3}{4}$ inch in diameter and 1 inch in height. It is filled with faecal emulsion and placed in a wooden

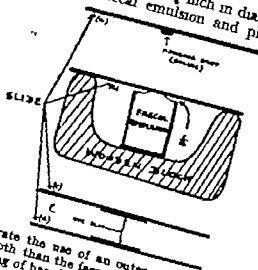


Diagram to illustrate the use of an outer wooden container of slightly greater depth than the faeces container to facilitate the taking of hanging drop preparations.
[Reproduced from the *Journal of the Malaya Branch of the British Medical Association*]

container excavated to a depth just greater than $\frac{1}{8}$ inch. The emulsion is made with saturated solution of common salt and when the faeces container is in position, more salt solution is added from a pipette until the surface is slightly convex. A slide with a drop of salt solution is inverted over the faeces container and rests on the wooden container so that contact is made between the hanging drop and the faecal emulsion. This is left for 15 minutes, after which the slide is lifted off and lowered on to a coverslip. The preparation may then be turned right side up without fear of mishap. The illustration explains the apparatus.

C IV

MARTIN (Gustav J.) THOMPSON (Marvin R.) & ACCOSTI (N. J.)
Therapeutic and Prophylactic Detoxication. Anthelmintics.—
Amer Jl Hyg 1941 Sept. Vol. 34 No. 2. Sect. D pp 23-35 [31 refs]

Experiments were carried out by producing acute poisoning with the anthelmintics, of 4,000 mice weighing 18 to 24 grammes each. In general the process of detoxication follows three lines—oxidation, reduction and conjugation—but at present only conjugation can be used to facilitate detoxication, and this may be done to render harmless either poisons produced by parasites in the host or those given to the host to kill the parasites. The mechanism of conjugate detoxication is one of enzymatic action, and in this the concentration of the substrate is a vital factor and is the single factor influencing the speed of the reaction, which can be altered.

"Ascaridole, aspidium and tetrachlorethylene represent groups of toxic chemicals used as anthelmintics. In acute toxicity experiments, it has been found possible to decrease markedly the toxicity of these substances by the concomitant administration of certain physiological detoxifying agents: ascorbic acid, glycine, glucuronic acid and cystine (sulphur-containing amino acid). When the detoxicants are given simultaneously the anthelmintic activity is affected adversely in the case of ascaridole while in the case of tetrachlorethylene enhancement is observed. In therapeutic practice the administration of the detoxicants, somewhat after the administration of ascaridole would avoid interference with the anthelmintic effectiveness.

Clayton Lane

HUBBLE (Douglas) Toxicity of Phenothiazine.—*Lancet* 1941 Nov 15 pp 600-601

"Phenothiazine is probably too dangerous a remedy to be used in the routine treatment of threadworms."

Hubble starts from MANSON BARR's advice [this *Bulletin*, 1941 Vol. 38, p. 516] that for threadworms this drug should be given in considerable dose: refers to reports of over 30 cases in which it has proved effective against threadworms, and mentions the work of DEEDE, STOCKTON and THOMAS (*Jl Pharmacology* 1939 Vol. 63 p. 353) who reported that three of 19 patients given the drug developed anaemia: indeed in one after 19.9 grammes there was a drop in red cells from 4,410,000 to 1,570,000 and a rise in reticulocytes to 35 per cent. Hubble himself gave the drug to more than 30 children, three of whom developed anaemia: two with toxic hepatitis in one red cells fell to 2,900,000 and haemoglobin to 60 per cent. in one with jaundice the liver enlarged to the umbilicus and was tender. Phenothiazine is very

efficient but its use is that of a potentially toxic drug in the treatment of a trivial infection and for that justification must be produced such as the repeated failure of safer drugs.

Clayton Lane

SCHMIDT (H) CHRISTIAN (T T) & SMOTHERMAN (W M) Is Phenothiazine Poisonous to Horses?—*Jl Amer Vet Med Assoc* 1941 Sept Vol. 99 No 774 pp 225-228

Until we know where the danger lies [the authors have had several deaths] phenothiazine cannot be considered a safe anthelmintic for equidae

This drug in doses of 60 grammes to mature mares of 45 grammes to a two-year-old and of 30 grammes to a yearling gave great improvement so their owner asked for treatment to be given to others—seven mares and three colts. The mares, weighing 1 000 to 1,250 lb were given 60 grammes each and two of them died after passing red urine the mucosa of mouth and eyes having a muddy yellow appearance. At necropsy muscles and kidneys were bright brick red with brownish fluid exudate the spleen was enormously enlarged dark reddish brown and diffuent. Transfusions saved the others. The same changes occurred in other horses and during transfusion the blood from the vein was noticed to be tarry.

The drug bought from the same firm varies in colour a fact not pointing to chemical purity. The authors note that LAPAGE found methaemoglobin in horse blood after a dose of 500 grammes.

In comment Benjamin SCHWARTZ reports that in the treatment of 600 horses, in a dosage of 30 grammes to a 1 000 lb body weight (0 066 gm per kilo) the drug was found safe and efficient.

Clayton Lane

ORTIZ (Adelmo A) Cuadros febriles bilharzianos [Fever in Bilharziasis].—*Gac. Méd de Caracas* 1941 Apr 30 & May 15 Vol. 48 Nos. 8 & 9 pp 256-263 268-273 With 4 charts.

In the Mansonian infection in Venezuela, fever may occur at the time of invasion and distribution of larvae or when the infection has become chronic and the liver no longer adequately deals with toxins or again when intestinal lesions have let bacilli into blood and so into kidneys.

Fever is more frequent in children than in adults and in males than in females. Hepato-splenomegaly was present in 34 per cent of cases studied dysentery in 39 in 91 per cent there were other intestinal parasites (*Necator* *Ascaris* *Trichuris* and amoebae) bronchial signs were present in 34 late fever in 78, early fever which sometimes simulated typhoid in 21 per cent. The fever of invasion responds well to foudadin the late chronic form to tartar emetic.

Clayton Lane

AMARAL (A Dacio F) & DE LIMA (Plinio) Sobre o encontro de exemplares adultos de *S. mansoni* na cavidade intestinal em casos de autopsia [*S. mansoni* found in the Intestinal Lumen at Autopsy].—*Brasil Medico* 1941 Mar 29 Vol 55 No 13 pp 237-240 English summary

The worms were found at each of 5 autopsies in the sieved and washed contents of the small and large intestine the material being got by scraping

MONTHLY BULLETIN Manila P I 1940 Oct. Vol. 20 pp 339-340 —
 Notes on the Schistosomiasis Campaign in Surigao Leyte, and
 Mindoro. [Summary taken from *Public Health Engineering*
Abstr Washington. 1941 Sept Vol. 21 No 9 p. 35 Signed
 Crit PHARRIS]

Surveys of prevalence and geographical distribution of schistosomiasis were made in the provinces of Surigao Leyte and Mindoro during July 1940. The studies included examinations of schoolchildren, collection of the snail, *Blanfordia* (*Oncomelania*) *Quadrax*, the intermediary host of the parasite, treatment of dispensary cases, examination of blood and stool specimens and an educational campaign for the prevention of the disease in endemic areas. The prevalence of positive cases was not given for all people examined but in the province of Leyte 78, or 6.68 per cent of 1 163 dispensary patients were infected, while in Mindoro 90 or 9.67 per cent of 931 examinations in clinics were positive. One hundred and thirty five positive cases were found in the Maivit Municipality in Surigao.

More males were affected than females and the majority of cases occurred in children from 5 to 15 years, the age groups considered most likely to become exposed to the parasite-infected waters (ponds, canals, creeks, etc.) and to unsanitary homes and surroundings.

The principal clinical findings in cases were skin rashes, fever, chilly sensations, abdominal enlargement with pain and tenderness, enlarged liver and spleen, anorexia, nausea, vomiting, diarrhoea, with tenesmus and bloody mucoid stools, marked anemia, loss of weight and general weakness. The medical treatment consisted of the administration of Fuadin and Emetine hydrochloride under careful supervision of physicians.

The preventive and control phases of the campaign outlined consisted of personal and group instruction and measures for the elimination or protection of areas infected with the parasite.

TRELLES (J O) & LAZARTE (Jorge). Cisticercosis cerebral. Estudio clínico histopatológico y parasitológico. [Cerebral Cysticercosis.] —*Rev Neuro-Psiquiatria*. Lima 1940 Vol. 3 No 3. pp. 393-511. With 63 figs. [Bibliography]

The authors report on four cases of cerebral cysticercosis, one of which was diagnosed during life by virtue of a clear history of tapeworm infection followed by atypical convulsive attacks.

Photographs of macroscopic brain sections are clear and striking showing cysts on the surface and within the brain. Most lay in the cortex or meninges, in three of the four cases cysts lay in a ventricle, in one there was a large cyst in the septum lucidum, in one a cyst in the cerebellum though this is generally held to be a common site, in none was the midbrain infected. The host's histological reaction arranges itself in three concentric layers, an inner open one of neutrophils and of epithelioid cells including macrophages containing fat and other inclusions, a middle layer of collagenous fibres with plasma cells, an outer layer rich in reticulo-endothelial cells, lymphocytes, plasma cells (particularly well seen in their Fig 39) and giant cells as well as eosinophils. Within all lies the degenerate parasite or it may have been absorbed. Surrounding this reaction the arteries show inflammation involving all coats, and all the neuroglial elements and nerve cells show pressure or toxic changes.

Three symptoms overshadow the condition—convulsions, raised intracranial pressure and psychic changes. The first may be preceded by an aura the second shows itself in violent headaches, vomiting disturbance of vision with papilloedema but the psychic changes are the most obvious and have been minutely but variously classified. The changes in cerebrospinal fluid are not always typical the pressure may be at zero albumen may register 1 in 1 000 eosinophils though a distinctive feature may be absent deviation of complement may be present or absent and so may the intradermal reaction X-rays may help when cysts are calcified Biopsy of a cyst will settle the matter Surgical treatment guided by localizing symptoms has done good but the usual multiplicity of cysts does not hold out much hope. Prophylaxis lies in prompt treatment of strobiles and in proper supervision of meat so that cysticerci may not grow to strobiles in man

Clayton Lane

BARNETT (L.) The Incidence of Hydatid Disease in New Zealand.—*New Zealand Med J* 1941 Oct Vol 40 No 219 pp 273-278
[Summary appears also in *Bulletin of Hygiene*]

During 1940 there were 128 hydatid patients out of 121,255 patients in the Public Hospitals of these 77 were in North and 51 in South Island. In addition there were 84 hydatid patients in other hospitals. The author gives figures mostly in five year periods for the last 50 years in the Public Hospitals and in general they show a rising incidence. For example over 1904-1908 there were 315 cases while in the five years 1934-38 there were 586 cases. The mortality rate is approximately 14 per cent. The incidence of hydatid disease in sheep for the five years 1936-1940 was 44 per cent with a very similar percentage in cattle. In pigs the incidence is believed to be high but no official data are available. There are about 200 000 dogs in New Zealand and the author estimates from laboratory investigations that about one-third of the country dogs harbour the adult hydatid worm (*Echinococcus granulosus*) in their intestines. In town dogs infection is very rare the different incidence being due to the fact that they are rarely fed on raw offal while this is very common with country dogs. The crux of prevention lies in efforts to deal effectively with the country dog. Education and persuasion have been tried very extensively but have so far been comparatively ineffective. The author mentions legislation and enforcement but makes no definite recommendations. Pre-boiling of the offal (if given at all) and suitable tapeworm medicine for the dogs are the main preventatives.

W G Savage

WILHELM (Ottmar) Contribución al estudio de la hidatidosis en Chile. La equinococosis en Concepción. [On the Study of Hydatid Infection in Chile. The Echinococcus in Concepción.]—*Rev Chilena de Hig y Med Preventiva* 1941 Mar Vol. 3 No 4 pp 281-289

The incidence of Echinococcus infection is alarmingly high in Concepción, Chile and needs strong measures to bring it down.

In 1940 there were admitted to Concepción hospitals 15 patients with hydatid cysts. In the municipal slaughter house 8,920 infected animals were discovered in 1939. The monthly percentages were

highest in cattle (17.97 to 45.28) less high in sheep (0.22 to 21.30) lowest in pigs (0 to 21.06) Infection in local dogs is as much as 38 per cent. Dogs must be rigorously excluded from slaughter houses in future.

Clayton Lane.

REAY (E. R.). Hydatid Diseases of the Kidney—*Australian & New Zealand Jl Surgery* 1941 July Vol. 11 No 1 pp. 9-23. With 34 figs.

The paper deals with the development of the typical unicellular cyst with certain general effects including anaphylaxis, and with the renal infection in various aspects. These last are illustrated by figures, pyelograms and photographs of excised kidney in certain instances both from the same kidney. It is compiled from the records of the Hydatid Registry of the Australian College of Surgeons and from seven personal cases.

Practical points regarding anaphylaxis are these—care to prevent soiling of the tissues during operation this to be performed under general anaesthesia which usually abolishes anaphylaxis operation unless urgent (and it seldom is in these cases) to be deferred for 14 days if a cyst has ruptured anaphylaxis to be treated with adrenalin. Interesting pyelograms, some diagrammatic illustrate (1) how after the wall of a pelvic calyx and of the adjacent adventitial coat of a hydatid have become absorbed, the opaque fluid may pass outside the true cyst wall and produce a wineglass shadow an appearance not to be confused with that of a calcified cyst (2) how when the true cyst wall has also been opened, daughter cysts are shown up as clear areas in a general opacity. Such cysts escaping from a mother cyst in the upper part of the kidney may pass down the ureter or may collect in a dependent calyx of the renal pelvis.

Diagnosis is conclusive if hydatid material is passed, presumptive if a smooth rounded lumbar tumour should appear in one enjoying good health. Progress is slow and may pass into inactivity the cyst may rupture into the urinary passage with possibility of anaphylaxis or bacterial infection it may extend beyond the kidney. Operative procedures are nephrectomy rarely partial nephrectomy and evacuation of the cyst without or with drainage reserving the latter for open suppurating cysts in cases where nephrectomy is inadvisable or where there is any doubt about removal of the parasite having been complete.

Clayton Lane

MEADE (J. A.) & BARNETT (LOUIS). Echinococcus Alveolaris (Alveolar Hydatid Disease) associated with Ordinary Hydatid Cysts of the Liver—*Australian & New Zealand Jl Surgery* 1941 Apr Vol. 10 No 4 pp. 317-327 With 8 figs. [12 refs.]

This case unique in the New Zealand records of hydatid disease adds one more to the small but growing list of sporadic instances of *alveolaris* lesions in countries previously supposed to be exempt.

The case history by Meade shows that this woman, aged 59 had been admitted into the Dunedin Hospital in 1928 with high blood pressure liver enlarged to 6 inches below the costal arch, hydatid complement fixation test negative. She was re-admitted in 1940 aged 71 with a hard epigastric swelling, hydatid complement and Casotti tests negative. A provisional diagnosis of secondary carcinoma of the liver

was followed by exploratory examination under local anaesthesia. An old hydatid cyst was marsupialized and a piece was taken from the right lobe of the liver where there was a yellowish grey nodulated mass suggesting carcinoma but thought perhaps to be an unusual hydatid manifestation. Microscopically it consisted of many cyst like spaces surrounded by cellular infiltration including giant cells and by fibrosis. On the eighth day she had a left hemiplegia and died two days later.

In his discussion Barnett writes that as in most sporadic instances of alveolar hydatid the ordinary and the alveolar types were combined in the same patient. Proof as to whether these are different species would be theoretically possible if a properly prepared dog were fed on the alveolar parasite (which however is usually sterile) but its presence is not usually detected till necropsy and worm free dogs are not usually kept ready the slender and less curved hooklets which are supposed to characterize the alveolar infection may at least be simulated in the ordinary form.

It will I think be generally accepted that this case is a genuine specimen of a hydatid lesion of the alveolar type superadded to a long-existing cystic form of the disease.

It is a mixed or transitional form similar to certain other sporadic cases that have been recorded as arising outside the Bavaro-Tyrolean endemic area.

It supports the theory of the unicists that mutations can occur in the ordinary growth of hydatids and that therefore there is no necessity to postulate the existence of two different species of the *Taenia echinococcus*. In other words the hydatid parasite is pleomorphic influenced in its modes of development by differences in terrain. Dew supports the theory held by Ponselt that cattle so prone to hydatid infection in the multilocular form may be the intermediate hosts responsible for the alveolar mutation.

The microscopic structure of the alveolar lesion is quite like that of an infiltrating malignant growth sometimes with metastatic extensions to glands and to distant organs. The records suggest a possibility that to begin with the patients' ay harbour for many years hydatid cysts of the ordinary type and that the alveolar lesions are superadded as the patients come to middle or old age. This may indicate a malignancy mutation due to the influence of something corresponding to a carcinogenic factor. The absence or poor development of the protective hyaline ectocyst in the infiltrating micro-vesicles and the consequently unrestrained urge of the germinal membrane or endocyst, to which Dew has called attention, are also suggestive of malignancy.

The alveolar hydatid grows and expands only by exogenous buddings and extrusions of germinal membrane. Growth though slow is unchecked and relentless fatal. There is never cessation walling off obsolescence as sometimes occurs with benign hydatids. The central part of the mass sooner or later undergoes necrosis liquefaction and cavity formation. Thus, I think, heralds the end of the patient's life.

Prognosis as regards cure is just hopeless though in the absence of metastases as in the New Zealand case life may be maintained in fair comfort for a very long time.

Barnett tried to communicate with Dévé and writes —
 Protocols photographs and liberal portions of the pathological material hermetically packed were promptly posted to him at Rouen. But Rouen alas shortly afterwards, came under the savage fury of German bombardment and no doubt Dévé and his laboratory must have suffered more or less in this ruthless onslaught. Months have passed and I am

[July 1942]

Tropical Diseases Bulletin

sorry to say that I have had not one word from my old friend and regular correspondent, and my last communications have been returned to me marked "undelivered."

Clayton Larr

Utz (Friedrich) Beitrag zur Diagnose des infiltrierend wachsenden Echinokokkus, unter besonderer Berücksichtigung des Zusammenhangs mit Unfall. [The Diagnosis of infiltrating Hydatid, especially in Relation to Accidents].—*Med Klin* 1940. July 12. Vol. 38. No. 28 (1855) pp. 777-779

SAPERD (James J.) The Hookworm Problem. Some General and Military Aspects. A Report of the Examination of 1,169 Naval Recruits.—*U S Nav Med Bull* 1940 Jan. Vol. 39. No. 1 pp. 138-143 (13 refs)

It appears to be a common view that hookworm infection in a man in apparently perfect health is of no serious consequence, and that the hookworm problem is no longer of main importance in the south eastern United States. Naval data show that the contrary conditions hold.

Between 1918 and 1925 the incidence of *Necator* infection in 15,929 southern naval recruits was 23 per cent. After the hookworm campaign instituted by the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease and the International Health Commission of that Foundation the incidence fell from 19.87 in 1925 to 0.72 in 1932. So in that year routine faecal examination of naval recruits was discontinued, particularly as the International Health Board of the Foundation had intimated that hookworm disease had almost disappeared from the United States. Yet STILES at that very time had emphasized that hookworm infection was still widespread in the south.

Simple faecal smears were examined from 257 Norfolk recruits the method was chosen because the previous naval hookworm studies had been made by it. It gave an incidence of 11.3 per cent., raised to 21.0 per cent. when 699 recruits were examined by the Willis gravity flotation method. But when only the deep south States were tested the lowest percentage of infection was 9.8 in Tennessee and the remaining States varied from 20 to 42 per cent. When by this technique infected were distinguished from non-infected the average haemoglobin in the former was 76.04 per cent. and in the latter 62.79 and a proportion of infected men felt to be surprisingly showed well defined anaemia. The presence of minor hookworm disease in the south some harm. The presence of infection in men with up to 16 selected naval group postulates a serious condition in the south generally. In noting the presence of infection in service may reasonably be ruled out. (But in transferring the observation to a conclusion that hookworms may live for that time it would be well for readers of this Bulletin to remember that when men have gone home on leave they will usually have gone back to the place where their original infection was acquired.) Once more coloured men were less infected than white.

Clayton Larr

BROC (R.) & CALO (A) Étude sur les répercussions cardio-vasculaires de l'ankylostomiase et d'autres helminthiases [The Effects of Ankylostomiasis and Other Helminthiases on the Cardio-Vascular System.]—*Arch Inst Pasteur de Tunis* 1941 June Vol. 30 No 1-2 pp 77-102 With 16 figs [50 refs.]

From Tunis these authors report in ankylostomiasis and in certain other worm infections the following chronic cardio-aortic conditions Clinically there are dyspnoea palpitations and cardiac murmurs and signs of cardiac insufficiency while radiographs show dilatation of the left ventricle and fairly often of all the heart cavities and of the aorta. This syndrome is no complication but is caused by the anaemia and by helminthic toxins and is influenced favourably by restoring the blood and removing the parasites
Clayton Lane

i. PESSOA (S B) & PASCALE (Humberto) Pesquisas sobre a ancilostomose em São Paulo Sobre o método de Stoll Hausheer para a contagem de ovos nas fezes. [Investigations on Hookworm Infection in São Paulo The Stoll Hausheer Method for counting Eggs in Faeces.]—*Arquivos de Hig e Saude Pública* 1941 Jan Vol. 6 No 11 pp 13-22. English summary [11 refs]

ii. — & — Tratamento da ancilostomose pelo tetracloretileno [Treatment of Hookworm Infection by Tetrachlorethylene.]—*Ibid* pp 23-29 [16 refs.] English summary (7 lines)

iii. — & — Observações sobre o tratamento da ancilostomose pelo tetracloretileno baseadas em contagens de ovos antes e depois da administração do remédio [Observations on the Treatment of Hookworm Infection by Tetrachlorethylene based on Egg Counts before and after Treatment.]—*Ibid* pp 61-65 English summary

iv. — & — Sobre a eliminação de *Necator americanus* e de *Ascaris lumbricoides* após tratamento antihelmintico [Removal of *N. americanus* and *A. lumbricoides* after Anthelmintic Treatment]—*Ibid* pp 72-76 English summary (7 lines)

v. — & LUCENA (Durval) Sobre a disseminação de helmintos nos habitantes de uma localidade saneada. [The Distribution of Helminthiases in a Sanitized Locality]—*Ibid* pp 79-97 [11 refs.] English summary

vi. — & PASCALE (Humberto) Intensidade da ancilostomose nos escolares de vários municípios. [Intensity of Hookworm Infection in Scholars of Various Municipalities.]—*Ibid* pp 66-71 English summary

i. The Stoll Hausheer method for counting eggs in faeces—The Stoll Hausheer counting method (which uses 1/200 gramme of faeces diluted in decinormal caustic soda solution) was compared with counts from simple smears (whose size seems nowhere stated) and with worm recoveries after treatment with carbon tetrachloride tetrachlorethylene or oil of chenopodium (the individual drug used not being specified)

In a series of 31 persons the following means are reported eggs to the gramme before treatment 1 690 (200 to 9,200) all *Necators* collected after treatment 93 3 (1 to 517) female *Necators* so collected 46 2 (1 to 242) number of eggs in the gramme for each female worm 36 5 and

for each Necator 18.1. As usual these mean numbers varied with the worm load. In a series of 19 from whom the female worms recovered averaged 9.8 the eggs numbered 52.5 per female per gramme. In a series of 12 with a mean worm load of 10.4 the mean number of eggs per worm per gramme was 13.9. Another error in calculating worm loads from egg counts was illustrated by treating persons who were negative to macroscopic examination. 7 persons negative to a smear when examined by DARLING and SWILLIE in 1921 and subsequently treated, expelled a mean of 4.3 worms. When the authors so treated 8 persons negative to the Stoll Hausheer method, their average collection was 5.9.

They note once more that this method misses light infections; they note too that they have not used D.C.F. or D.C.F.F. [which would detect them].

ii. *Treatment of hookworm infection by tetrachlorethylene*.—Using the evaluating test of SCHUFFNER and VERVOORT on five series of patients the authors have found tetrachlorethylene effective though intoxicant.

That is to say two treatments were given. The first was by tetrachlorethylene, oil of chenopodium being added if the Willis gravity floatation diagnostic technique showed *Ascaris* eggs to be present as well as those of hookworms. The second treatment was by carbon tetrachloride in dosage of 4 cc. for adults and 2 to 3 cc. for children. The stools were collected for 48 hours after treatment and 10 to 15 days later were again examined as before for eggs. Of the 60 persons so treated, 51 were found to have become unwormed so far as could be judged by this test. They fall into five groups in four of which the after purge was a saline. (1) A group of 21 adults who got 3 cc. of tetrachlorethylene with expulsion of 88.2 per cent. of the total hookworm collection. (2) A group of eight adults dose 4 cc. expelling 95.8 per cent. (3) A group of eight adults, dosage 2 cc. tetrachlorethylene and 0.75 cc. oil of chenopodium, expulsion rate 91.8 per cent. (4) A group of nine children dosage tetrachlorethylene 1.5 cc. and oil of chenopodium 0.25 cc. given in castor oil, expulsion rate 17.0 per cent. (5) A group of five children taking the same dosage as group 4 but followed by a saline purge expulsion rate 70.2 per cent. Half or rather more of the treated became dizzy or drunken.

iii. *Observations on the treatment of hookworm infection by tetrachlorethylene based on egg counts before and after treatment*.—About 200 persons between 11 and 50 years old were treated with tetrachlorethylene or with carbon tetrachloride the doses in either case being 0.1 cc. for each year of age below 20 while for adults it was 3 cc. The results were estimated by faecal egg reductions as revealed by the Stoll Hausheer method.

When after either of these drugs an aperient of magnesium sulphate was given the number of Necator eggs was reduced by about 60 per cent. after one treatment with carbon tetrachloride or after two by tetrachlorethylene. When one treatment of the latter was given the reduction of eggs was to about 50 per cent. To 50 children aged under 10 oil of chenopodium was added to these drugs in a dosage of half a drop for each year. The Necator egg count was reduced by about 70 per cent. When to 48 children under ten the mixture of tetrachlorethylene and oil of chenopodium was given in castor oil the Necator egg count was reduced by a mere 8 per cent. When to 26 children also under ten this same tetrachlorethylene-chenopodium mixture was given, but presumably in saline the egg numbers dropped by 56 per cent. When

13 adults received 2 cc of tetrachlorethylene and 20 drops of oil of chenopodium the Ascaris egg counts dropped by 86 per cent. whereas when 17 others had 2 cc of tetrachlorethylene alone their Ascaris egg counts rose by 9 per cent [such is the authors' calculation of a rise from 43,600 to 58,000 eggs to the gramme of faeces]

iv Removal of *N. americanus* and *A. lumbricoides* after anthelmintic treatment.—The anthelmintic treatment consisted of carbon tetrachloride and oil of chenopodium followed an hour later by a saline purge and counts were made of the worms that were collected after one or two or more stools compared with the total collection after this one treatment. Presumably the fact of infection was first established by a table showing separately the sexes of hookworms recovered but not those of Ascaris and no case seems to be included in more than one table. As to Necators, washings of the first stool gave total collections of 328 and 18 washings of the first two after treatment stools of six persons gave 690 of the total collection of 1,092. Comparisons are made of the worm recoveries on day one and on day two from heavily and from lightly infected persons. 20 heavily infected persons passed 6150 Necators were got 44 worms on day one and 283 on day two. From ten Ascaris infections were got 44 worms on day one and 49 on day two. but four other anomalous cases are listed who together passed three worms on day one four on day two none on day three and 23 on day four. *The distribution of Helminthiasis in a sanitated locality.*—These examinations determine the extent of detected infections in inhabitants of a sanitated town close to São Paulo and in the soil round their houses.

Of 1,271 persons examined by the Stoll Hausheer technique 61.4 per cent harboured Necator 68.2 Ascaris 49.5 Trichuris and 12.1 other parasites. girls were more heavily infected than boys particularly with hookworms when the privies were made houses the families were less heavily infected than when they were outside the relative figures being Necator 39.3 and 59.3 Ascaris 74.4 and 89.5 Trichuris 75.1 and 79.6.

Round six schools the soil was examined by the Baermann method for Necator larvae and by the Caldwell's method for worm eggs. That round five of the schools was negative for hookworm larvae some being present about the sixth round all of them the soil contained Trichuris eggs sometimes in great numbers and some being embryonated round all of them Ascaris eggs were present but their numbers were smaller. Similarly 15 households and the house surroundings were examined, the results being given in detail. Of the 37 children there examined infections by any worm were detected in 34 (Necator 18 Ascaris 32 Trichuris 27). Of six samples of earth taken from near privies six contained Ascaris eggs three Trichuris eggs. One Enterobius egg and one is held to have shown Necator eggs. Dust from sweepings of 13 houses showed Ascaris eggs in 12 Trichuris eggs in five Enterobius eggs in three. It is advised that the school should be a centre of instruction as to means for preventing the spread of these parasites.

vi Intensity of hookworm infections in scholars of various municipalities.—Of 1,177 schoolchildren examined by the Stoll Hausheer technique 75 per cent showed Necator eggs in the

faeces. There was no significant difference between the sexes. The more rural areas showed infections running up to nearly 99 per cent., the more suburban to about half that figure. Among children whose homes had latrines 70.1 per cent were found positive, among those who had not the infection figure was 85.2. It is felt that a new hookworm campaign is needed here and that it should essentially be in the hands of school teachers rather than in those of the sanitary staff.

Clayton Lane.

PESCOA (S B) & PASCALE (Humberto) Intensiidade da ancllostomose em algumas fazendas de café no município de Ribeirão Preto. [The Weight of Hookworm Infection in Some Coffee Plantations in the District of Ribeirão Preto.]—*Arquivos de Hig e Saúde Pública* 1941 Jan. Vol 8 No 11 pp 30-37 With 3 graphs. English summary

PESCOA (S B) & PASCALE (Humberto) Análise da infestação pelo Necator em uma fazenda de café e cana no município de Sorilândia [Analysis of Infection by Necator in Coffee and [Sugar] Cane Plantations in the Municipality of Sorilândia]—*Arquivos de Hig e Saúde Pública* 1941 Jan. Vol 8 No 11 pp 38-60 With 4 graphs. English summary

LIU (H L) & WONG (Y R) The Passage of Numerous Ascaris b. brisicae from the Male Urethra. Report of a Case.—*Chinese Med. J* 1941 June Vol 59 No 6 pp 570-574 With 2 figs on 1 plate

A 37 year old farmer was admitted to the hospital with the complaint that he had passed for twenty years, at intervals, large roundworms from the urethra. While in hospital, he passed during four weeks before final operation 21 *Ascaris lumbricoides* of both sexes from the urethra. On one occasion, a photograph was taken of a worm just as it was leaving the urethra. At the age of 17 the patient had suffered from symptoms which made it very likely that at that time he had had appendicitis, with formation of an abscess, which had later opened into the intestine. Stool examination showed eggs of *Ascaris* together with eggs of *Trichuris* and hookworm. Urine, obtained by means of a catheter likewise contained *Ascaris* eggs and also B. coli and other bacteria. Cystoscopy revealed a small shadow at the upper posterior portion of the intestinal loops exploratory laparotomy showed extensive adhesions of the bladder wall among each other and to the bladder. A vermifuge was given and several more worms were passed from the urethra but none came out in the loins. Cystotomy was performed and a portion of the sinus into the lumen containing a small sinus was cut out. During operation, it was impossible to pass even a thin catheter through the bottom of the sinus into the lumen of a fistula may have been widened when urinary bladder was filled. The wounds caused by the operation healed without complication, no more worms were passed, and the patient left the hospital in good condition. It may be added that he showed always a perfectly balanced mind without symptoms of hysteria or a desire to make himself interesting. There is, therefore, no reason to doubt his statements concerning the passage of a large number of worms from the urethra over a period of many years. Since *Ascaris* as is well known cannot multiply in the same host, it is certain that the patient must have become frequently re-infected.

The man had a peculiar sensation when the worm was about to come out, so photographs of its exit could be made.

Clayton Lane

IYENGAR (M O T) Occurrence of *Wuchereria bancrofti* Infection in a Rural Area.—*Indian Jl Med Res* 1941 July Vol 29 No 3 pp 677-679

Wuchereria bancrofti infection which was known to have an urban distribution in India was recently found to occur in a rural area in Birbhum district (Bengal). The filarial infection rate in two villages examined was 17 per cent. Cases of elephantiasis of the leg and scrotum were also observed to occur. These villages showed a high incidence of malaria indicating that the presence of malarial infection in the population was not antagonistic to the occurrence of filarial infection. The transmitter of malarial infection as well as of filarial infection in these villages was found to be *Anopheles philippinensis*. In one specimen of *A. philippinensis* both malarial and filarial infections were observed. The salivary glands showed a heavy infection with sporozoites while within the labium and thorax were many full-grown larvae of *W. bancrofti*. This would indicate that the same mosquito could transmit both malarial and filarial infections at the same time.

MENON (T Bhaskara) & RAMAMURTI (B) The Behaviour of the Infective Larvae of *Wuchereria bancrofti* with Special Reference to their Mode of Escape and Penetration of Skin.—*Indian Jl Med Res* 1941 Apr Vol 29 No 2. pp 393-401 With 3 figs. on 1 plate

The experiments were carried out on laboratory bred *Culex fatigans* released inside mosquito nets for the method of inserting the hand into a small net scared this timid mosquito nor was the use of a net covered beaker successful in inducing the mosquito to feed.

1 Warm fluid at about 36°C around the mosquito to feed. activity of the larvae in the proboscis and active attempts at escape.

But if the fluid were too warm the larvae retreated tail first from the proboscis into the mosquito's head or even body as was observed when a stunned mosquito was watched under a microscope with powerful transmitted light.

2 Actual larval escape from the proboscis occurs only under conditions similar to those obtained during the act of biting, i.e. the labium pushed up on the stylets is bent in its proximal half and warm fluid at about 36°C is sucked up through the stylets.

3 Viability of infective larvae is best in human blood and yolk of egg when kept in sealed chambers without exposure to air and free from sepsis. The maximum survival period obtained experimentally was more than a week, but no visible growth took place during this period.

4 Active infective larvae under experimental conditions do not penetrate unbroken skin but migrate through the tissues only when deposited on the moist tissues in a breach in the skin and do not appear to have any taxis when deposited in the neighbourhood or over a breach of skin surface.

5 The experiments do not lend any support to the view that *W. bancrofti* can get into the human tissues from water through abrasions in the skin.

LEHRFELD (Louis) & BREISACHER (Carl F) A Case of Trichinosis presenting Chemosis of the Bulbar Conjunctiva.—*Jl Amer Med Assoc* 1940 Nov 23 Vol 115 No 21 PP 1794-1795 [12 refs.] Clayton Lane

The authors feel that chemosis of the bulbar conjunctiva has not been sufficiently stressed as and indeed is not generally considered to be a symptom of trichinosis.

They describe a woman who came to hospital with chemosis so marked that the swelling protruded between the lids while a blood count showed 10,800 white cells with 25 per cent. of eosinophils and the temperature ran as high as 105°F. A piece of excised gastrocnemius showed encysted larvae but these John Bozicevich of the United States Public Health Service held to be third stage larvae the result of an earlier infection than that causing the present illness. Stated in more detail the eye symptoms were slight swelling of lids with none of forehead, the chemotic conjunctiva had a yellowish waxy appearance with slight injection of vessels corneae were clear irises, pupal reactions and fundi were normal.

Clayton Lane.

BLAHM (Edgar H.) & JORGENSEN (Milton N.) Some Effects of Experimental Trichinosis in the Dog.—*Proc Soc Experim. Biol & Med.* 1941 June Vol. 47 No 2 pp 294-299 With 3 figs.

DEFICIENCY DISEASES

EFREMOV (V V.) Experimental Avitaminoses of the B₂-Complex Group and Pellagra of Man.—*Acta Med URSS Moscow* 1939 Vol 2 No 4 pp 622-630 [21 refs.]

This comprises an account of experiments on production of experimental avitaminosis of the B₂ complex group in animals and a comparison of these diseases with human pellagra.

In rats on a basal diet, with addition of yeast extract as a source of vitamin B₂ for 25 days, a cessation of growth took place then dry egg albumen was added as a source of riboflavin and 50-60 days thereafter dermal changes appeared. The terms acrodynia or "florid dermatitis," which have been applied by GRÖGNY CHICK and their associates to this condition, are unacceptable as not corresponding to the pathological substratum of these disturbances.

The name erythroedema (erythema and oedema) is suggested as conveying a better appreciation of the process which begins with reddening and oedema of the dorsal aspect of the phalanges on one or both paws. When progressive it results in gangrene. From histological studies it was ascertained that both clinically and histologically B₂ avitaminosis in white rats resembled pellagrous erythema of man. Experiments with sunlight irradiation showed that there is no provocative action of sunlight as regards appearance of erythroedema. B₂ avitaminosis of rats was perfectly cured by administration of autoclaved brewers yeast as well as by an eluate from yeast extract.

The skin lesions accompanying ariboflavinosis in white rats consist of symmetrical and asymmetrical loss of hair resulting in complete baldness of some skin regions and were most often observed around the "spectacle area" in the eyes. Some of the bald portions subsequently became eczematous through secondary causes. The term "alopecia" is proposed in this condition, and histological investigation showed great differences between B₂ avitaminosis and the skin lesions in ariboflavinosis.

Shortly before death rats with avitaminosis B₆ and ariboflavinosis showed serious disturbances of the central nervous system with atrophy of certain groups of muscles. Vitamin B₆ preparations did not affect these changes but they were prevented by daily administration of 10-20 milligrammes of riboflavin.

In dogs deprived of the vitamin B₆ complex no changes were noted in the mouth or the mucosa of the tongue but striking phenomena consisting of disease of the pyramidal and of the Purkinje cells of the cerebellum and combined degeneration of the lateral pyramidal tracts and dorsal columns of the spinal cord were noted. A special effort was made to produce the black tongue syndrome in dogs. In fact in adult dogs no close analogy with human pellagra was obtained and in puppies also there was failure to do so but in all the animals the disease was serious in that it proved fatal in 78-124 days. Histological examination again revealed the most marked changes in the nervous system as already described. In the peripheral nervous system the sensory changes in the tongue and nerve fibrils of the intestine were much more affected. It is suggested that lesions of the mouth and tongue described by GOLDBERGER and others presumably result from secondary infection.

In monkeys (*Macacus rhesus*) kept on a diet consisting mainly of cereals millet barley white rice sugar and carrot with a sufficient daily calorie value the conditions were after a period of 6-8 months mainly similar to the above.

Thus similar conditions were obtained in three classes of animals widely separated from each other phylogenetically by excluding vitamin B₆, riboflavin and nicotinic acid from their diet but absolute identity of symptoms or the sum total in each species could hardly have been expected. It is suggested that in each case the pathological changes were associated with central nervous degeneration. These observations go a long way to refute the photodynamic theory of pellagra in its narrowest interpretation. Thus it has been noted that pellagrous erythroedema might develop in bedridden patients after surgical operations. At the same time it could not be established that there was any connexion between the intensity of the skin affections and the gravity of the disease. Grave cases of pellagra in man frequently develop in the absence of skin lesions.

In all cases there were disturbances of gastric secretion usually anacidity but frequently hyperacidity refractoriness to histamine so that patients with achlorhydria and other disturbances of the gastrointestinal tract would seem to be particularly liable to pellagra. The combined progressive degeneration of sensory and motor fibres in the central nervous system resembles that observed in experimental animals and also the subacute combined degeneration associated with pernicious anaemia.

The author therefore considers it permissible to assume that in spite of all endeavours the complete reproduction of the pellagra syndrome in man will never be obtained by experimental work in lower animals.

P. Manson-Bahr

SPRUE.

OLLEROS (Angel Rodriguez) Estudio gastrico en el síndrome "espru tropical" (gastroscofia cromoscofia y bacteriología) [Gastric Studies in Sprue.]—*Publicaciones de la Universidad de Santo Domingo* 1940 Vol. 9 19 pp

This communication contains a summary of bacteriological investigations of the gastric mucosa in sprue by gastrosopic methods. The author showed that in 82 per cent of sprue cases the gastric mucosa was colonized by intestinal flora. It would appear that under tropical conditions the antibacterial defences which normally predominate in the intestinal tract are broken down and that this acts as a predisposing factor in the genesis of sprue. As is well known the normal gastric mucosal surface at pH 1.4-1.6 is sterile the duodenum at pH 5.2-6.2 contains a few Gram-positive cocci the upper jejunum at pH 6.8-7.0 Gram-positive cocci and a few Gram-positive and negative bacilli. The ileum at pH 8.8-9.0 contains a rich bacterial flora of the faecal type.

There is, therefore a distinct relationship between the pH in different regions of the intestinal tract and the prevailing bacterial flora.

P. Manson Bahr

HAEMATOLOGY

LEICHSENWING (Jane M.) DONELSON (Eva G.) & WALL (Lucille M.) Studies of Blood of High School Girls.—*Amer J Dis Children* 1941 Aug Vol 62 No 2 pp 262-272 [21 refs.]

[This paper though not concerned with tropical conditions, is abstracted here because normal standards in temperate climates may be useful to tropical workers. The same applies to the paper by WIEHL, below.]

Haematological studies on 258 normal girls from 12 to 19 years old were made in Minnesota. The mean haemoglobin content was 12.21 ± 0.80 gm. (the standard error is used) red cell count $4,150,000 \pm 240,000$ white cell count $7,340 \pm 1,770$ proportion of reticulocytes, 1.08 ± 0.65 per cent and the diameter of the red cells 7.60 ± 0.20 microns. The Hb was determined by the Newcomer method and the cell diameters determined by measuring one diameter of 100 cells in dried stained films by means of a filar micrometer.

The Hb values were lower for the 14 to 17-year-old groups than for the 12 to 13 or the 18-year-old groups. The average percentage of reticulocytes gradually decreased with age, and the mean red cell diameter showed a slight increase. The white cell counts were uninfluenced by age. Comparison of the data in girls past the menarche with those of the girls before the menarche in the same age group showed that menstruation had a lowering effect on haemoglobin levels in the 14 to 15-year-old group but not for those in the 12 to 13 group. It is suggested that Hb values and red cell counts in adolescent girls are more influenced by the rate of growth than by menstruation. The

mean age of the menarche was 12.9 ± 1.1 years and the mean length of the periods 4.6 ± 1.2 days. [The mean age at which the menarche occurs depends on the method of grouping and by adopting different systems differences of ± 6 months are obtained. There is no indication here of the method employed.]

WIEHL (Dorothy G.) *Selecting Cases of Anemia among Adolescents.*—*Amer J Public Health* 1941 Oct Vol 31 No 10 pp 1073-1078. With 2 figs

During a survey of nutritional deficiencies in high school groups in New York State blood examinations were made on two sets of adolescents from 12 to 18 years old. The haemoglobin was determined with the photoelectric colorimeter by the Evelyn method. Erythrocyte counts and haematocrit readings were made. The first group of approximately 350 children mostly Jewish came from high income families the second included over 2000 individuals from a poor neighbourhood and a large percentage of these were also Jewish. Boys showed a rapid increase of the Hb level at the ages 13 to 14 years and this continued to the age of 17. In girls the highest Hb value was at age 12 though the number of cases at this age was too small to be statistically significant. The rapid change of Hb content during these years is associated with growth and the demand for iron and this leads to the assumption that the Hb level may be more closely correlated with the stage of maturity than with the chronological age. Boys were therefore roughly classified into four categories according to the development of pubic hair and girls into four categories according to breast development. Mean Hb levels of boys in the same developmental class but of different ages were very similar. The blood changes appear to be closely associated with puberty and they are of such a magnitude that it is necessary to take account of development in all cases of apparent anaemia selected on the basis of age standard. The change in girls was in the opposite direction. Those having moderate breast development had somewhat higher Hb values than girls in the adult class. When the two groups were compared it appeared that some of the girls in the low income families had at least a mild anaemia but few of the boys in the same group were deficient in Hb.

NAPIER (L. Everard) NEAL EDWARDS (M I) & DAS GUPTA (C R.) *Haematological Studies in Indians. Part XIII. Normal Indian Women in Calcutta.*—*Indian J Med Res* 1941 Apr Vol 29 No 2 pp 375-391 With 1 graph

Blood examinations done on 134 apparently normal Calcutta women included total red and white cell counts haemoglobin estimations reticulocyte count corpuscular values eosinophil polynuclear and platelet counts van den Berg reaction red cell fragility sedimentation rate and Wassermann tests. Statistical tables are given of 128 subjects as 6 were eliminated on account of anaemia. Between the ages of 15 and 38 there is little change in the blood picture save that the total leucocyte counts progressively decrease and the polynuclear index progressively increases. The Bengalee women show a significantly lower haemoglobin value than other Indian women.

studied in this series of researches. The haemoglobin found here is also nearly 20 per cent. less than the comparable previously determined figure for males in Calcutta. The sedimentation rate found was significantly higher than the usual text-book figure and indicates that a high rate in Calcutta should not *per se* be taken too seriously.

W P Kennedy

RUSSELL (Beatrice A S) **Macrocytic Anaemia in Pregnant Women on the Gold Coast.**—*Lancet* 1941 Dec. 27 pp 792-795 [11 refs.]

One hundred severe cases of macrocytic anaemia in pregnancy which condition is not uncommon on the Gold Coast were analysed. Thirty-eight of the cases were under the author's care and in these the onset was rapid, and the duration of symptoms seldom more than a fortnight. The disease often started before the last quarter of the year. In addition to the common symptoms of acute anaemia, swelling of the feet, cough, fever, dysentery and oliguria occurred. As is common on the Gold Coast the condition was usually complicated by helminthic infection and the positive Wassermann rate was the same as that of the general population which is about 32 per cent. Without treatment the condition progresses rapidly and may end fatally in a few days or may be cut short by the onset of premature labour.

Treatment was by rest, full diet and liver by mouth or by injection. Blood transfusion and induction of labour were seldom required. The response was good and the fatality rate in the series only 5 per cent. In both treated and untreated cases there is a tendency to premature labour with stillbirth or death of the infant in the first week. The author considers that macrocytic anaemia is not a disease of pregnancy but a disease associated with pregnancy and amongst the predisposing factors are poor diet, malaria and hypochromic anaemias.

W P Kennedy

CLARKE (John H C) **A Case of Tropical Megalocytic Anaemia.**—*East African Med J* 1941 Aug Vol 18 No 5 pp. 154-155

A native woman was admitted to hospital in Northern Rhodesia semi-comatose and intensely anaemic after giving birth to a premature child 10 days before. There had been no post partum haemorrhage. The red cell count was only 750 000 and the colour index 1.5. No malaria parasites or spirochaetes were found in the blood, but normoblasts, megalocytes, punctate basophils and polychromasia were present. The spleen was enlarged, there was pyuria, the patient lay with a fetid brown discharge oozing from the mouth, there was no oedema. Four injections of anaheemin were given and in five weeks the red cells had increased to 3 075 000 but megalocytosis remained. The spleen was smaller but still just palpable.

The patient had been discharged from the hospital, to which she had been admitted for cystitis and slight anaemia, 12 days before being readmitted in this state of collapse and the case is interesting because of the suddenness of the onset of the intense anaemia. The author has not found any other reference to this condition in the area.

C W

TROWELL (H. C.) Liver Extract in Treatment of Tropical Macrocytic Anaemia.—*Lancet* 1941 Sept 13 pp 303-304

Nutritional tropical anaemia does not respond to treatment as well as pernicious anaemia half-a pound of whole liver daily is usually curative in the latter but the former needs four times as much. Other workers' results with various liver extracts are discussed. The author chose two from the 12 cases in his care during 1940 as they showed no evidence of other complicating disease. Weekly doses of 5 to 10 cc of liver extract (B D H) produced satisfactory response. The author suggests that this extract may be more effective in this type of anaemia than the refined extracts which cure pernicious anaemia. It is also cheaper.

IV P Kennedy

Bass (Murray H.) Extreme Eosinophilia and Leukocytosis. An Unusual Clinical Syndrome of Unknown Origin occurring in Childhood.—*Amer Jl Dis Children* 1941 July Vol. 62 No 1 pp 68-79 With 1 coloured plate [10 refs.]

The author has seen three cases of this condition and this paper reports the outcome of the second case first described in 1831 and of the third case which has been observed for 18 months.

The first case in a girl of six years lasted 2½ months during which eosinophils varied between 39 and 70 per cent and they were mostly mature. The child died of broncho-pneumonia and there was no autopsy. The second case was in a boy of eight years admitted to hospital on account of vomiting with alternate diarrhoea and constipation. He had a generalized lymphadenopathy. There was a chronic cough with rhonchi but the temperature was normal. Leucocytosis was persistent the count ranging between 24 000 and 45,200 while the mature eosinophils varied between 33 and 73 per cent. X-ray showed mild pulmonary infiltrations. After some three years the chest X-rays were normal and the eosinophilia gradually disappeared in the course of seven years. Nine years after onset the eosinophils were 1 per cent and the total white cells 12 000. He was then in excellent health.

The third case was in a 6½-year-old negro boy with rickets. There was leucocytosis and 22 per cent of eosinophils. The temperature ranged up to 102 the spleen was palpable as were numerous lymph nodes. There were no indications of the cause of the eosinophilia.

A full discussion of the pathology and symptomatology compared with the cases reported by others leads to the conclusion that this syndrome fails to fit into the category of any previously described conditions. While the cause remains unknown it appears probable that it is some type of chronic infection. [See also this *Bulletin* 1939 Vol 36 p 421 1941 Vol. 38 pp 538 539]

IV P Kennedy

DERMATOLOGY AND FUNGUS DISEASES.

GOMEZ FARIAS (R.) Investigation of the Presence of Spirochete causing Pinta in Five Hundred Cases.—*Rev Med Milit* 1939 Vol. 2, p 32. [Summary taken from *Arch Dermat & Syph* 1942, Jan. Vol 45 No 1 pp 163-164 Signed CANTILANER.]

Gomez Farias reviews the history of different theories of causation of pinta. The mycotic theory advocated by Montoya Flores was the most popular one until recently. The disease was also attributed to avitaminosis. Gonzales Herrejon in 1927 first suggested the theory that the disease was caused by a spirochete. The high incidence of positive Wassermann reactions was a strong argument in its favor. Saenz Alfonso and Grau in 1933 first discovered the causative spirochete. The author performed dark field examinations in 500 cases, and in 98 per cent of them the organism was found.

MELENEX (Henry E.) Pulmonary Histoplasmosis. Report of Two Cases.—*Amer Rev Tuberculosis* 1941 Aug Vol 44 No. 2, pp 240-247 With 5 figs [12 refs]

In a review of histoplasmosis the author briefly mentioned certain unpublished cases [this Bulletin 1941 Vol 38, p 335]. The present paper describes two of them in more detail. They were of interest because of the pulmonary features which before death had led to a diagnosis of malignant disease and tuberculosis. The correct diagnosis was not made till after death when it was found that the lungs were involved in nodular formation with cavitation. In one case acid fast bacilli were found in the lung lesions, while in the other they were discovered in the sputum during life. It would seem that in both cases sections of the lesions revealed endothelial cells packed with the causative organism. Attention is called to these cases in men 69 and 50 years of age and it seems probable that histoplasmosis may be more common than has been suspected and that familiarity with the disease will lead to its diagnosis in many cases before death. C. M. Weyon.

MISCELLANEOUS

OTTEN (L.) The Government Lymph Establishment and the Pasteur Institute 1891-1940.—*Nordic Dermat & Venerologisk Tidsskr* 1941 Vol 30 No 3/4 pp 214-230 [10 refs.]

ROX (M. A.) WILCOX (A.) & LILLIE (R. D.) Estimates of the Azure and Methylene Blue in Preparation of a Satisfactory Grams Stain from Dyes of American Manufacture.—*Public Health Rep* 1941 Sept 26 Vol 56 No 39 pp 1908-1909

There is a wide variation in the dye content of different lots of azure B available in the United States. The authors have found that the composites of azure A, azure B and methylene blue are easily prepared and of constant composition so that by using them variations in composition of stains may be avoided.

Eosinates of the basic dyes were prepared by dissolving 2 grams of each in 200 cc of distilled water. A 10 per cent solution of eosin Y (certified by the Commission of Standardization of Biological Stains) was added 15 cc at first and then in 1 cc quantities until the resulting solution in thin layers was pale blue without any pink between the particles. The eosinate precipitate was filtered out on hard filter paper in a Buchner funnel with vacuum and then dried.

The amended formula for Giemsa stain is —

Azure A eosinate	50 mgm	
Azure B eosinate	250	
Methylene blue eosinate	200	
Methylene blue chloride (88 per cent)	100	(50-75 mgm may be enough)
Glycerin	50 cc	
Methyl alcohol	50 cc.	

This stain after standing a few days is diluted 1 in 50 with distilled water buffered to pH 7.0. Staining takes place for 45 minutes and the results with malaria parasites and trypanosomes are very satisfactory [See also this *Bulletin* 1940 Vol 37 p 876] C II

Louw (J H) "Desert Sores."—*South African Med J* 1942 Jan. 24 Vol. 16 No 2 pp 43-44

The sores described in a military unit do not include those caused by *C diphtheriae* or tropical ulcer, oriental sore, malignant pustule or sporotrichosis which were not seen by the author [but readers may recall that the name desert sore of the war of 1914-1918 was associated closely with diphtheritic lesions of the skin. See this *Bulletin* 1920 Vol. 16 pp 153 215]

The sores described were largely septic cuts or abrasions, furunculosis or the sores which start as painful blisters. It was remarked that men who disregarded personal hygiene and cleanliness repeatedly suffered and that neglect of timely first aid was an important factor. The incidence of sepsis in transport drivers who usually have oil or grease on their limbs was notably less than in the remainder and it is thought that dryness of the skin is a predisposing factor. The diet of the troops was good.

First aid consisted of prompt application of 1% benzoin collodion or tincture of iodine with occlusion by elastoplast (especially for insect bites) or cleansing of larger wounds with saline and application of acriflavine ointment or powdered sulphonamide and closure with elastoplast. Treatment of developed sores with acriflavine ointment or sulphonamide and elastoplast was highly successful. Unguentum zinci was useful as a covering for the sulphonamide. Elastoplast dressings were usually left undisturbed for several days and the part immobilized as far as possible. Boils were treated with fomentations, carbuncles with sulphonamides locally.

Acriflavine ointment consists of acriflavine 0.1 per cent, adeps lanae (anhydrous) 45 per cent, water to 100 per cent. To this may be added 10 per cent. sodium sulphate for the osmotic effect. If this cannot be made, a mixture of equal parts of emulsion acriflavine 1 in 1000 and unguentum zinci or anhydrous lanoline is a good substitute. These treatments are most effective. It is pointed out that although these sores do occur the men are healthier than they have been for years. C II

HOYSE (Archibald L.) & LARIMORE (Granville W.) Sulfathiazole as a Cause of Death. Report of Patient with Acute Agranulocytosis.—*Jl Amer Med Assoc* 1941 Oct 18. Vol. 117 No 16. pp 1353-1354

The patient a man of 34 in apparently good health gave a history of exposure to venereal infection, and his physician prescribed a course of sulphathiazole of not more than 40 tablets each of 0.5 gm. to be taken at the rate of eight tablets a day. The patient however obtained further supplies and continued to take from two to eight tablets a day until about 200 tablets had been consumed. Two months after his first visit to the physician he was admitted to hospital with a diagnosis of laryngeal diphtheria, and died within a few hours. Autopsy revealed the condition as acute agranulocytosis with severe membranous and gangrenous pharyngitis and laryngitis.

Although death from agranulocytosis attributable to sulphathiazole has previously been reported in a very sick person, this is apparently the first case in which a man in good health has succumbed to this condition arising from prolonged medication with the drug

C IV

WILDISH (G. H.) Larva Migrans. [Correspondence].—*Trans. Roy Soc. Trop Med & Hyg* 1941 Sept 9 Vol. 35 No. 2 p. 129

The author gives the following directions for treatment —

"Add 1½ drachms iodoform to 2 oz. ether and cork in a suitable bottle. Take a piece of lint of a size to freely cover the area affected, cut oiled silk ¼ inch or so larger than the lint, damp the lint with water (damp it only do not wet it). Pour the iodoform solution on the skin, pour some on the one side of the lint, apply covering with the oiled silk and bandage. Change three times a day.

The condition is usually cured in 48 hours. Secondary infections may be treated in the ordinary way, the author uses a wet dressing of 1 volume of methylated spirit to 4 volumes of 1 in 4 000 hyd. perchlor solution.

C IV

CHU (Ta-Hsiung) Note on Leech Infection in Man.—*Chinese Med Jl* 1941 Sept Vol. 60. No. 3 pp. 241-243

Four cases are reported, probably the first to be recorded in China three from Lotien, one from Chaotung. In each case the leech was found in the nostril and had probably entered during the act of drinking. The parasites measured from 20 to 57 mm. in length and corresponded morphologically with members of the genus *Haemopsis* (Savigny 1820). The habits of this genus are similar to those of *Limnatis*, the adults living at the bottom of pools, the young near the surface whence they can readily be swallowed by animals. Horse leeches are common in these areas and are chiefly acquired during the dry season.

C IV

EARLE (K. Vigors) Echinoderm Injuries in Nauru.—*Med Jl Aus tralia*. 1941 Sept. 6 28th Year Vol. 2 No 10 pp 265-268. With 1 fig

The *cane* of Nauru, or sea-urchin *Centrochismus setosus* has a body of 3½-4 inches and spines ranging from 1-3 inches in length each with a

considerable range of movement and rotating towards any spine which is touched. Each is barbed the barbs directed towards the free end. The ends of a fractured spine exude a red fluid like Condys fluid. Unlike the spines of the West Indian sea urchin (*Centrechinus antillarum*) the spines are not phagocyted after penetrating the human body but remain and may set up inflammatory mischief some long time later three months in a case recorded by the author. The spines are not themselves poisonous injury is purely mechanical or due to secondary infection. Removal should be attempted but is not easy as the spines are very brittle. H H S

MEDICAL JOURNAL OF AUSTRALIA. 1941 Aug 16 28th Year
Vol. 2 No 7 p 177—**Persimmon Ball in the Stomach.**

Persimmons are a popular fruit in some countries but are rarely eaten before they are ripe on account of their astringent characters when unripe. This astringency is due to shibuol. Children however may eat the unripe fruit with disastrous results due to the shibuol coagulating on coming into contact with the HCl of the gastric juice and gumming together into a fairly firm mass pieces of fruit pulp or skin or other starchy food. In this way a persimmon ball may form and give rise to symptoms varying in degree from gastric discomfort and dyspepsia to nausea vomiting and acute distress and passing through the pylorus to duodenal or intestinal obstruction for it may measure some three inches in diameter. Their presence may cause ulceration. These balls are not pliable nor friable and attempts to force them on by giving purgatives are fraught with danger for obstruction is facilitated. The only effectual treatment is removal by operation the ulcer if present being dealt with at the same time. H H S

DAVIES (J N P) & HEWER (T F) **Alnham Report of a Case in England with Histological Study**—*Trans Roy Soc Trop Med & Hyg* 1941 Sept 9 Vol 35 No 2 pp 125-128 With 5 figs

A negro 55 years of age a ship's stoker was admitted to the Bristol Royal Hospital. He had worn shoes for the past 36 years. Seven years ago he noticed a cleft in the skin on the inner and plantar aspects of the left little toe. During the next six years this cleft deepened and became inflamed and recently the right little toe began to show a cleft. X rays revealed calcification of the tibial and dorsalis pedis and interosseous arteries. The shaft of the proximal phalanx of the left toe showed thinning from absorption of the cortex and the head of the bone was mostly absorbed. Serum tests for syphilis were negative.

Amputation was carried out post-operative healing was slow. The pathological histology of the removed digit is described. The general condition was that given in the text books but the details of the changes at the site of constriction are not stated in text books and are thus described by the authors —

A section through the site of constriction towards the head of the proximal phalanx shows the same keratinization and a cleft passing right through the epithelium of the plantar aspect. This cleft is lined by granulation tissue and reaches to within a quarter of a millimeter of the periosteum. The granulation tissue has evidently been present for a long

time and contains numerous foreign body giant cells. There is a chronic periostitis surrounding the phalanx, the reaction being similar to that in the skin wound—many foreign body giant cells are present. There is no necrotic material other than that in the skin cleft and bacterial stains show no organisms. In this section the subcutaneous collagen is very dense and acellular—it encloses nerves and blood vessels and is firmly attached to the periosteum. The bone here measures 4 mm in diameter and is rarefied—there being no complete layer of compact bone beneath the periosteum."

There is no suggestion that the arteriosclerosis and calcification played a part in the anhum condition, though they may be held responsible for the slow healing after operation. It is suggested—but no evidence is adduced—that some fungus, an epidermophyton may be the initial cause of the disease—a chronic epidermophytosis producing excess of cicatricial tissue and resultant constriction. H H S

TESKE (Jacob M.) Alhum. Report of a Case.—*Arch. Dermat. & Syph.* 1941 Dec Vol 44 No 6 pp 1108-1109 With 1 fig

A negro of 48 in Alabama showed typical alhum and gave a history of one year. The cicatricial ring completely surrounded the little toe of one foot. The Wassermann was negative and there was no evidence of tinea or other skin infection, but on the inner part of the digito-plantar fold there was some skin ulceration. Amputation was performed. C IV

BERMAN (Charles) The Etiology of Primary Carcinoma of the Liver—with Special Reference to the Bantu Races of South Africa.—*South African J. Med. Sci.* 1941 Nov Vol 6 No. 4 pp 145-156. [123 refs.]

"Information relative to the etiology of primary liver cancer ascertained during an enquiry into the incidence and nature of the disease amongst the Bantu of the Witwatersrand is presented and discussed.

Primary carcinoma of the liver is a disease in which racial factors appear to play a prominent part. It is very rare amongst all white-skinned races irrespective of geographical distribution, whereas it is common amongst most pigmented races particularly the Bantu the Javanese and the Japanese. In the Bantu it is preeminently an affection of young adult males.

"The view that cirrhosis of the liver is an intermediate stage in the evolution of cancer is substantiated. Multifolular cirrhosis was an accompaniment in every Bantu case studied, and in 73 per cent. of cases recorded in the literature.

The chief toxic agents apparently concerned in the production of cirrhosis are indicated. In the Bantu these include helminthiasis, malaria, schistosomiasis, haemochromatosis and alcohol. Amongst other races additional factors considered are infestation with *Taenia echinococcus*, *Opisthorchis felinus*, and *Clonorchis sinensis*.

"The literature concerning recent advances in the experimental production of primary liver cancer is reviewed. [See also this B.M.J. Vol. 38, p. 540]

[Other references to primary carcinoma of the liver in tropical countries may be found in this *Bulletin* 1932 Vol 29 p 532 1933 Vol 30 p 259 1935 Vol 32 p 522 1936 Vol 33 p 558]

SCHNEIDER (O) Bemerkenswerte Erscheinungsformen von Geschwülsten im tropischen und subtropischen Asien (Beteltumoren) und ein spekulativer Erklärungsversuch der Geschwulstentstehung überhaupt. [Betel Tumours and Speculations on the Origin of Tumours.]—*Schweiz Med Woch* 1941 Dec 13 Vol. 71 No 50 pp 1552-1554

The tumours which arise in chewers of betel and some other tumours commonly met with in the tropics afford the author a great opportunity to present his views on the origin of tumours in general. It is interesting to note that betel chewing and opium smoking are rather sharply delimited the one from the other in the populations practising these customs. The betel compost is a mixed one consisting of areca nut betel leaf wrapping and lime with a little addition of cigarette tobacco. A profuse salivary secretion results from its presence in the mouth which however is not swallowed but ejected. It is not quite certain which of the constituents on the basis of chronic irritation is to be incriminated as carcinogenic. Females as well as males young as well as old are given to betel chewing and malignant epithelial growths in the mouth due to this cause have consequently a decidedly different age and sex distribution from that commonly accepted. The great majority of the tumours are squamous cell carcinomas although rodent ulcers are also described. These may be situated in the lower lip tongue and palate. Sarcomas have been traced to the periosteum of the jaws and to the antrum while a few tumours such as fibromas are benign in character.

From the subject of tumours in betel chewers—not betel tumour as it has erroneously been called—the author passes for a great part of the article to well informed speculation on the origin of tumours. He comments on certain peculiarities of tumours as met with in tropical and subtropical lands which are peculiarities of geographical and racial distribution.

As regards carcinogenesis the author's view seems to be that malignant trauma is one primarily to the nucleus of the cell. The nucleus is dispersed into the cytoplasm in the form of seeded particulate matter and is still capable of reconstituting itself by molecular fusion in living form as the generally accepted unit the cell. Thus he does not restrict himself to accepting the fully constituted cell as alone manifesting vital energy. His theory therefore passes for the origin of life to simpler units of molecular dimensions. He elaborates this speculation likewise into his tumour theory by way of such conceptions as polymerization or depolymerization of the protein molecule. For these views he produces illustrations such as those of the homologous and heterologous tumours the mixed tumours such as fibro-chondromyxosarcoma and malignant tumours all as instances of intra cytoplasmic seeding and molecular commingling.

In conclusion he says. Of course the whole is a pure speculation so far as concerns the actual process of tumour development. No direct reference appears to be made to the concept of gene mutation

W F Harvey

MREYEN (F W.) Over djengkolintoxicatie [Djenkol Poisoning].—*Geneesk Tijdschr v Nederl Indië* 1941 Oct 7 Vol. 81 No 40 pp 2139-2146

The author describes the results of experiments with Djenkol in which he gave fresh raw beans, cooked beans, and beans (raw or cooked) which had been kept for 6 weeks, to a rabbit, several guinea-pigs and a monkey. The beans were given alone or with salt, or molasses, or coconut oil, or shrimps (garnalen) with hydrochloric acid, or with sodium bicarbonate. He also notes two fatal human cases. At post mortem the main brunt seemed to have fallen on the kidneys which were very hyperaemic. The jejunum and liver showed slight congestion. Otherwise the findings were negligible and in the words of the author the point of attack, from the view of pathological anatomy remains still obscure. [See this Bulletin 1938, Vol. 33 p 724] H H S

SEATON (D R.) & LUMSDEN (W H R.) Observations on the Effects of Age, Fertilization and Light on Biting by *Aedes aegypti* (L.) in a Controlled Microclimate.—*Ann Trop Med & Parasit* 1941 Oct 21 Vol. 35 No. 1 pp 23-38 With 3 figs & 1 graph [19 refs]

The authors devised an apparatus in which batches of 10 female *Aedes aegypti* were given the opportunity of feeding on man while exposed to controlled conditions of atmospheric temperature and humidity (24.5-25.5°C and 4.5-5.5 mm Hg saturation deficiency). The effects of starvation, fertilization and light on the numbers biting were then studied. When virgin females were starved from the time of emergence the numbers which fed increased up to 72-120 hours and then began to fall off. The mean length of life under these conditions being 4-8 days. All the mosquitoes being dead after seven days. When these virgin females were allowed access to males on successive nights the numbers fertilized were found to increase with age. 12 per cent. on the first night, 50 per cent. on the second, 82 per cent. on the third. But fertilization had no effect on the avidity for blood. Exposure to light reduced the numbers biting. At an illumination of 0.5 metre candles the numbers were reduced by almost half as compared with the mosquitoes in darkness. V B Wigglesworth

HOSKINS (W M.) Recent Contributions of Insect Physiology to Insect Toxicology and Control.—*Hilgardia* Berkeley California. 1940 Aug Vol 13 No 6 pp 307-358 [15 pages of refs]

Poisons used to destroy insects enter by the mouth (stomach poisons) by the respiratory system (fumigants) or by the general or tracheal cuticle (contact poisons). Their action is thus determined on the one hand by their intrinsic toxicity for the different tissues, on the other by their ability to penetrate the cuticle to enter the tracheal system or to be taken up with the food. The scientific study of insecticides has thus to take account of their mode of action on the living cells, of those physicochemical properties which enable them to spread over or penetrate the cuticle or pass along the tracheae and of the feeding or breathing habits of the insects in question. In this review by

Hoskins will be found the most recent facts and hypotheses on all these matters. Insects of medical importance figure largely among the examples. There is a fairly full discussion on the mode of action of oils on mosquito larvae considered in relation to the general question of the entry of fluids into the tracheal system. I B Wigglesworth

MENTZER (R. L.) DAIGH (F. C.) & CONVELL (W. A.) Agents for Increasing the Toxicity of Pyrethrum to Mosquito Larvae and Pupae — *Jl Econom Entom* 1941 Vol 34 No 2 pp 182-186 With 1 fig [Summary taken from *Rev Applied Entom* Ser B 1942. Mar Vol. 30 Pt 3 pp 39-40]

An account is given of experiments to determine whether the effectiveness against mosquito larvae and pupae of an emulsion of oil containing pyrethrum extract prepared according to Ginsburg's formula with a light fuel oil substituted for kerosene is increased by the addition of pine oil ethylene glycol ether of pinene (D.H.S. Activator) or a terpene cyanoacetyl compound fenchyl thiocyanacetate (Thamite). For preliminary tests a long series of combinations was prepared by adding these activators in varying quantities to three oil emulsions the first of which was the standard larvicide while the others were similar except that one contained only half as much pyrethrum extract and the other none. Five combinations were finally selected for comparison with the standard. The oil in two contained the same amount of pyrethrum extract as the standard and either 5 per cent. D.H.S. Activator or 10 per cent. pine oil while that in the other three contained only half as much pyrethrum extract and either 5 per cent. D.H.S. Activator 15 per cent. pine oil or 2.5 per cent. Thamite. Laboratory tests usually fourfold with untreated controls were made with larvae and pupae of *Culex pipiens* L. *Aedes vexans* Mg. and *A. sollicitans* Wlk. The technique is described. Counts were made 1, 4 and 24 hours after treatment. Field tests were also carried out with *A. sollicitans* in a salt marsh in Delaware and counts made 24 hours after treatment. The percentage mortalities of each species effected after the various intervals had elapsed by each of the six larvicides diluted at 1:10 and 1:20 and applied at 50 U.S. gals. per acre are given in a table. In the laboratory tests all larvicides diluted at 1:10 were more toxic than those diluted at 1:20 and *A. vexans* was more resistant than the other species. There was some indication that pupae were more susceptible than larvae to materials at 1:10 since higher mortalities after 1 and 4 hours were often recorded. The difference in toxicity between the larvicides appeared more pronounced in the case of the 1:20 than the 1:10 dilutions especially after 4 and 24 hours. All experimental combinations were more toxic than the standard after 1, 4 and 24 hours when diluted at 1:10 and after 24 hours when diluted at 1:20. Both with regard to toxicity and cost an emulsion in which the oil contains half as much pyrethrum extract as the standard and 5 per cent. D.H.S. Activator used at the recommended dilution of 1:10 was the most satisfactory. In the field tests each experimental combination at 1:10 killed a higher percentage of larvae than that (95) killed by the standard. The toxicity at 1:20 was usually equally satisfactory. No harmful effect on fish (*Fundulus* spp.) or salt marsh vegetation (*Spartina*) was noticed.

CHANDLER (ASA C.) A Case of Urinary Myiasis. [Research Notes].—*Jl Parasitology* 1941 Oct. Vol. 27 No 5 p. 463.

The patient a woman of 32, in Texas, passed about 15 third stage larvae of *Lucilia sericata* in the urine all on one occasion. Thereafter she complained of pain in the bladder and the urine was found to contain red and white blood cells albumen, and many motile bacilli. No information as to the source of the infection could be given.

C IV

REES (C. W.) REARDON (Lucy V.) & JACOBS (Leon) The Cultivation of the Parasitic Protozoa without Bacteria.—*Amer Jl. Trop Med.* 1941 Sept. Vol 21 No 5, pp 695-716 [98 refs]

MILLS (Clarence A.) The Influence of Climate and Geography on Health.—*Bull New York Acad Med* 1941 Dec. Vol. 17 No 12, pp 922-933. [Summary appears also in *Bulletin of Hygiene*]

Man and certain other warm-blooded animals can utilize for work only 20 to 25 per cent. of the total combustion energy they are about as efficient as good petrol engines but not nearly so efficient as Diesel engines, which convert 37 per cent of energy into work. Although the body is highly adaptable to external temperature in so far as heat loss is concerned, yet when exposed continuously to high temperatures there is a tendency to reduce heat production with consequent slower growth retarded development, reduced fertility lowered resistance to infection and lowered energy for thought or action. For instance the stature of children born in the United States and later taken to the Panama Canal zone deteriorates more and more with each year of residence there. Human fertility is highest at mean monthly temperatures round 65°F it is depressed at temperatures below 40° or above 70°. Menstruation commences later in tropical than in temperate climates the contrary view is commonly held but the author claims that it is not supported by statistics. The onset of fertility is delayed in hot countries in the tropics illegitimate first births come at practically the same maternal age as legitimate, in temperate lands illegitimate first births come at much earlier maternal ages.

Experiments on mice have shown that moist warmth reduces the ability to survive inoculation with pneumococci, and production of antibodies after bacterial vaccination is much more active at 65°F than at 80°F. In man indigent tuberculous patients born in or north of Cincinnati survive the disease about twice as long as those born near the Gulf of Mexico.

In general, it is the infectious diseases which kill off the people of the tropics, but in temperate climates death is due more to degeneration or metabolic breakdown. For instance diabetes is more severe in cool countries, pernicious anaemia is rare in the tropics, admissions to hospital in Cincinnati for heart failure are four times as frequent in winter as in summer. Intelligence tests in students are answered on a lower level in summer than in winter.

A second climatic factor that of cyclonic storminess, appears to be responsible for the initiation of many types of infectious disease, particularly of respiratory and rheumatic types. Death and sickness rates

rise in the colder and more stormy years. Ability to survive these diseases however depends largely upon mean temperature levels and ease of body heat loss.

The author shows that if cellular combustion is slowed by external warmth the vitamin B requirement for each gramme of food is sharply increased so that in animals at 90°F the thiamin requirement is twice as great as at 65°F. Moreover in the tropics it appears that the vitamin B content of foods is less than in temperate climates. Human needs are therefore higher but the available supply is lower. This probably constitutes one basis for the poor nutrition and low vitality prevalent in residents in the tropics.

Toxic effects of thiamin are described—they resemble the syndrome of hyperthyroidism—insomnia nervousness hyperirritability emotional instability rapid pulse palpitation nausea and vomiting. More severe symptoms of collapse syncope circulatory shock and even death have been ascribed to over dosage with thiamin which is now commonly used in large doses as a medicament. It is possible that toxic reactions to thiamin occur more freely in people suffering from multiple vitamin B deficiencies. [The reader may refer to a previous paper by the author on climate and metabolic stress see *Bull. of Hyg.* 1940 Vol. 15 p 68.] C W

HARLEY (George Way) *Native African Medicine. With Special Reference to its Practice in the Mano Tribe of Liberia.*—pp xvi+294 With 1 plate & 1 map 1941 Cambridge Mass Harvard University Press, London Humphrey Milford Oxford University Press. [21s]

DRECHSLER (Charles) *Prodigious Fungl.*—*Biol. Reviews* 1941 Oct. Vol. 16 No 4 pp 285-290 [87 refs.]

REVIEWS AND NOTICES

PUBLICATION OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE No 15 *A Symposium on Human Malaria with Special Reference to North America and the Caribbean Region.* [Publication Committee BOYD (Mark F) Chairman SOULE (Malcolm H) Secretary COGGESHALL (L T) CRAIG (Charles F) TALLAFERRO (W H) & WILLIAMS (L. L.) Jr Edited by MOULTON (Forest Ray)]—pp viii+368. 1941 Washington D C. Smithsonian Institution Building [32s 6d]

The foreword to this valuable contribution to malaria literature states that this volume presents a systematic comprehensive authoritative and thoroughly documented discussion of the problems of human malaria in North America and the Caribbean region. The claim is fully justified. Close students of malaria literature may find little that is new in this book—they will find, however extremely well documented summaries of nearly all the important contributions

epizootics and thus naturally is liable to cause confusion in diagnosis and reporting. In wild rodents the mixed infection makes it difficult to demonstrate plague because whereas plague requires at least three days to develop the other disease produces an acute septicaemia in less than 48 hours. Extensive epizootics were noticed also among domestic cats and these have been regarded as due in some cases to a filterable virus. The disease has been given the descriptive name *adeno-myelo-enterosis*.

A considerable number of strains of the plague bacillus of human, rodent and flea derivation were studied. It was found that the morphology of cultures depended on the organ from which the strain was taken and on the culture medium rather than on virulence. It was also found that the smooth form of culture instead of being the virulent form was when present in flat colonies or colonies with a depressed centre the least virulent. Other observations made were of the antagonism of some Gram-negative bacilli such as may cause non-plague epizootics to the development of the plague bacillus itself. A suggestion is also made that the occurrence of these non-plague epizootics in rats might justify further enquiry into the possibility of reviving the discredited biological prophylaxis of plague.

W F Harvey

TROPICAL DISEASES
BULLETIN

Vol 39]

1942

[No 8.

THE PHYSIOLOGY OF THE SMALL INTESTINE ITS
APPLICATION TO THE AETIOLOGY OF SPRUE.

A CRITICAL REVIEW

By Z. A. LEITNER M.D (Berlin) L.R.C.P & S (Edin)
Clinical Assistant and Research Worker St Mary's Hospital W.2

Surprisingly little is known about essential pathological changes in the small intestine which are vital to the production of intestinal disease

In recent years the leading signs and symptoms of pernicious anaemia sprue and pellagra have been contrasted with the object of defining some common factor linking these apparently dissimilar diseases together^{1, 12, 13}

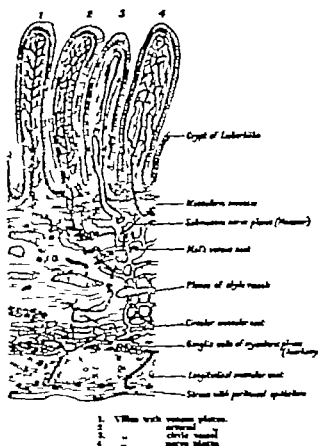
The Sprue Syndrome

Many since HESS-THAYSEN^{11, 21, 22, 23} have stressed that there exists no fundamental difference between tropical and non tropical sprue. Some have even suggested that the sprue syndrome is evolved from delayed coeliac disease in infancy⁸. The main points are glossitis, steatorrhoea, emaciation, progressive anaemia (usually macrocytic), hypochlorhydria—sometimes achylia and, it may be, pigmentation of exposed parts. The geographical distribution of tropical sprue is well known, but the number of cases of non tropical sprue so far described is not large enough to permit of any generalization on this aspect of the subject. The clinical picture of tropical and non tropical sprue can be reproduced by totally dissimilar states such as lacteal obstruction due to tuberculosis²⁴ malignant disease of mesenteric glands^{25, 26} or gastrocolic fistula^{27, 28, 29}.

So far apart from minor anatomical changes such as aplasia degeneration and increase of reticulum in the villi no destructive lesions have been found in tropical non tropical sprue and in idiopathic steatorrhoea. In order to explain this anomaly a critical review of modern ideas of the physiology of the small intestine has been undertaken.

Anatomy of the small intestine as bearing on the present problem.

Apart from the well-known points of the structure of the small intestine the mucosa consists of muscularis mucosae tunica propria and epithelium. According to modern histological research the muscularis mucosae has an outer longitudinal and an inner circular



Section of ileum to show structure of villi (Partly after J. SCHRAFFER "Verlesungen über Histologie," 1924 modified by VERHAR and McDONAGALL, 1936)

layer extending upwards into the valvulae conniventes (Kekring) with offshoots into the villi. Meissner's plexus is mainly concerned with the innervation of the villi and is also closely connected with the muscularis. The tunica propria contains loose connective tissue, blood and lymph vessels and nerve fibres and its function is to secure proper nutrition and free movement of the epithelium, consisting as it does of a single layer of columnar cells.

The main interest in the present exposition centres on the villi—these are elevations 1 mm. by 0.1–0.25 mm. in width in number of 10 to each sq. mm. of mucosal surface. The centre of each villus is a lacteal ending blindly and accompanied by a network of nerve fibres and vessels. The

surface cells are mainly of the columnar absorbing type but there are also mucus-secreting goblet cells. Paneth and enterochrome cells whose function is as yet unknown. In between the villi are Lieberkühn's follicles lined mainly with Paneth cells.

For the proper understanding of its functions the motility of the small intestine is important. Three types have been described—segmenting, peristaltic and pendular. The nature of the pendular movements is not quite clear as they are only seen in the opened abdomen as to and fro movements of the intestinal contents in the same loop and are due apparently to intermittent contractions of different portions of each individual loop. From the physiological aspect segmenting movements are most important. These are fairly regular and diminish in frequency with increased distance from the stomach in the ileum for instance they occur at the rate of about twelve per minute. The term metabolic gradient (ALVAREZ, 1940) is used in this connexion, and indicates that the upper portions have a higher rate of metabolism and excitability than the lower. These contractions ensure a thorough mingling of the digestive fluids with the intestinal contents and intimate contact with the intestinal wall without any measurable transitory effect on the column but the progress of the chyme is caused by peristaltic waves and is effected by spiral rotation.

The bulk of the chyme moreover exerts a direct irritating effect on the wall producing contraction proximal and relaxation distal to point of contact. The segmenting movements are rendered ineffective by application of nicotine or cocaine which act on Auerbach's plexus and so abolish peristalsis.

Antiperistaltic movements have not been observed in the lower part of the small intestine but if a portion is excised and reinserted in the opposite direction partial obstruction occurs as peristaltic waves cannot travel downwards and in consequence the intestine above this level dilates. When however Auerbach's plexus is inhibited, or paralysed this effect is abolished and food may travel upwards or downwards.

The duodenum is the only portion of the small intestine where antiperistalsis—usually a fact which determines the periodical filling part—normally occurs in λ -ray diagnoses of duodenal ulceration of the duodenal cap in a most striking feature of modern experimental physiology.

The biology of the villi is a most striking feature of modern experimental physiology. The central lacteal, which has a blind end communicates by its free end with the lymphatic plexus in the submucosa and there are valves present along its course to prevent reflux from the deeper plexus whilst safeguarding the normal flow. Contraction of the fibres of the muscularis shortens the villi and at the same time empties the central lacteal (as has been shown by microcinematographic films by KOKAS and LUDÁNYI 1930) so that as soon as absorption commences the villi are in continuous movement, contractions occurring 3-6 times or even more per minute.

VERZÁR (1931) has calculated that the amount pumped out by one contraction only from a surface 200 cm. by 5 cm. is as much as 5 cc. which would correspond to a discharge of fluid of 15-30 cc. per minute. What then is the natural stimulus which sets this mechanism in motion? It has been shown that mechanical stimuli applied to the base of the villus cause contraction but that acetylcholine (which is the specific stimulus for Auerbach's plexus) has no effect. Contraction, however is secured by amino-acids yeast extracts but not by pure vitamin B₁ or B₂ (VERZÁR 1936). When the mucosa is stripped together with part of the submucosa and Meissner's plexus is left the movements are normal. The natural stimulus is probably provided by a hormone-villikinine (KOKAS and LUDÁNYI 1935 and 1938) which differs from secretin. This hormone which is extracted from the intestinal mucosa by dilute hydrochloric acid has been

shown to be present in the blood after hydrochloric acid has been placed in the duodenum (of experimental donor dog)

Absorption

The forces of absorption are filtration, diffusion and osmosis aided by surface activity, solubility and hydrotrophy on the one hand by electrolytic forces and permeability on the other. The mechanism of absorption is promoted by the movements of the villi. For water and crystalloid solutions absorption proceeds with its diffusion gradient. If the concentration is higher in the intestines it moves in the direction of the blood. This mechanism applies to the absorption of the carbohydrates, proteins and most minerals. With the subject of the present discussion the absorption of calcium and fats is specially important.

Calcium is absorbed only in water-soluble form and absorption is prevented by substances which form insoluble salts such as phytic acid, oxalates etc.⁴⁴ It may be that the calcium-fatty-acid-bile-acid complex is broken down after absorption in the liver or it may be that this breakdown occurs in the mucosa and that re-excretion of bile acids occurs solely through the liver (KLEINER 1931)

Phosphorylation

After being split by lipase in the small intestine the fatty acids combine with bile acids to form molecules which are water soluble and diffusible. The fatty acids liberated by the complex combine with glycerol to be later synthesized into neutral fat. VERRILL (1936) has suggested that an intermediary state—phosphorylation (glycerol plus inorganic phosphate)—occurs, which accelerates absorption of carbohydrates as well as of fats by lowering concentration in the cells and by producing a continuous high diffusion gradient between both sides of the living cells. This resynthesis aims at accelerating fat absorption as well as at rendering fatty acids non-toxic.

Relation of the vitamin B group to gastro-intestinal function.

The literature of this problem has recently been reviewed by ROSE GOLDEN (1941) and there are numerous radiological studies on this subject. In a group living mainly on high carbohydrate diet irregular deficiency pattern of the small intestine was found (disappearance of herring-bone structure with abnormal segmentation, coarsening and obliteration of mucosal folds) but after treatment by fractions of vitamin B all cases improved. VERRILL and his collaborators^{45, 46} demonstrated the influence of yeast powder on contractions of the villi, but found that almost complete cessation of fat and sugar absorption takes place after adrenalectomy or poisoning with mono-iodoacetic acid. Absorption is restored if cortin is supplied.

The relation of vitamin B to the adrenal cortex is very suggestive in relation to the present study. Young adrenalectomized animals do not grow if riboflavin alone is added to their food, but remain alive if flavinphosphoric acid, yeast or liver extract is added. This suggests that these substances may provide a substitute for the secretion of the adrenal cortex. Phosphorylation is therefore one of the systemic reactions of the body responsible for the utilization of important building materials and for correlating the general bodily reactions essential for colloidal equilibrium.

The yellow oxidizing enzymes consisting of phosphorylated riboflavin plus protein (WARBURG and CHRISTIAN 1933 1938) constitute a most potent oxidation reduction system. Probably the yellow enzyme represents a breakdown product of the substance in the cell with a colourless protein—probably alloxazine adenine nucleotide. The action is reversible oxidation-reduction. The yellow respiratory enzymes act usually as part of a combined enzyme system the activator consists of a protein plus the co-enzyme or co-enzyme I and co-enzyme II respectively (EVLER and SCHLENK, 1937). This enzyme system can act in the cells also in the absence of available iron compounds and in the presence of cyanides and carbon monoxide but other oxidation reduction enzymes—the cytochromes—cannot do so under similar circumstances. (KUTLIN 1929 KEILIN and HARTREE 1939) The essential influence of the vitamin B group on phosphorylation now appears strengthened by the recognition that the yellow enzymes are in fact phosphorylated combinations of riboflavin the co-enzymes phosphorylated thiamin. The importance of the vitamin B group is mainly in the maintenance of phosphorylation in intracellular metabolism by securing a high gradient between the different colloidal systems and by warranting diffusion. Evidence in this respect has been derived from a different angle. Thus LOEB (1932) found in Addison's disease that depletion of sodium is followed by a series of interferences especially in carbohydrate and to a lesser extent in fat metabolism so that not only phosphorylation but also permeability and osmosis are disturbed by imbalance of the electrolyte system especially that of sodium which is the main cation of the extracellular and that of potassium which is the main cation of the intracellular system. This may then be justly regarded as the essential disturbance in Addison's disease.

Thus it is possible for the vitamin B group to regulate general body reactions by phosphorylation and possibly influence the cortical hormones (or hormones) by keeping up the electrolyte balance. In connexion with the cytochromes already mentioned which are active only in presence of available iron there are certain pathological conditions where iron free haemoglobin derivatives (porphyrins) are increased in the circulation in faeces and urine. In these conditions the cytochromes are put out of action so that the main task of oxidation and reduction in cellular metabolism is taken up by the yellow enzyme co-enzyme system which contains B group vitamins. In some such manner as this a deficiency of these vitamins is bound to ensue.

The relation of porphyrin to intestinal dysfunction

Porphyrin appears to be a normal breakdown product of haemoglobin and out of the various varieties of the former pigment uroporphyrin is exclusively excreted in congenital porphyrin* 12, 17 & Porphyrins when broken down are absorbed by the intestines and are re-excreted with the bile in a manner similar to that of bilirubin.

* The term porphyrin is reserved for the syndrome Porphyrinuria simply indicates abnormal excretion of porphyrin in the urine without characteristic symptoms and signs.

Porphyria is mainly of interest because of its relation to abdominal abnormalities caused by the action of this pigment on the autonomic nervous system of the intestine. When injected intravenously or applied locally it interrupts the normal rhythmic contractions of the intestine (REITLINGER and KLEE 1928) and application of atropine does not restore the normal intestinal automatism (VANKOTTI 1935). Prostigmine on the other hand produces movements in the porphyrinized small intestine. Facts accumulated show that the local nervous mechanism of the intestine (Meissner's plexus) is inhibited by porphyrins and as this plexus is vitally connected with the motility of the villi increased porphyrin leads to inhibition of absorption.⁷²

This porphyrin reaction does not appear synchronously at all parts of the bowel so that spasms with atony may occur in the same part of the intestine. When the reactions of the autonomic nervous system are paralysed, or inhibited, the clinical and X-ray picture of an acute ileus may be reproduced, and this is what actually appears to happen to an acute attack of porphyria.

These physiological data have a distinct bearing on clinical medicine as evinced by the history of the following patient, a healthy looking man of 46 with enlarged congested liver (probably alcoholic). After an attack of vomiting a barium meal showed a normal stomach (Figs. 2, 3) a dilated duodenal bulb and a partial obstruction at the junction



Fig. 2. Partial obstruction at the junction of the first and second parts of the duodenum with megabulbus (no anatomical lesion was found at the operation).



Fig 3 Abnormal mucosal pattern and narrowing of the lumen of the upper jejunum. No dilatation, no changes of the mucosal pattern above the stricture. Megabulbus without dilatation of the stomach.

of the first and second portions of the duodenum. Some three months later he still appeared well though the dyspepsia and vomiting had increased and there was some loss of weight. This time a barium meal was more positive showing appreciable dilatation of stomach and duodenum with a six hour hold up. Immediate laparotomy showed not as had been suspected, an obstruction in the duodenum but an annular stricture in the upper jejunum (adenocarcinoma without glandular metastasis) necessitating resection of 14 inches of intestine with mesentery attachment. Within a week alarming symptoms of vomiting abdominal pains and deep toxæmia necessitated a further laparotomy and within two months four altogether had been performed. On the second adhesions were found on the third and fourth jejunal anastomosis and gastro-enterostomy carried out. Recovery was sure but slow and at the end of 1941 he had become stronger and had regained weight but now there was steatorrhœa (total fat 54.8 per cent. of which 77 per cent. was split). Once again severe abdominal attacks recurred with visible abdominal peristalsis and now there was achlorhydria (without response to histamine) macrocytic anaemia, hypocalcaemia (8.6 mgm per cent) serum bilirubin was 1.2 mgm per cent. blood urea 26 mgm. per cent. serum sodium 324 mgm per cent. serum phosphatase 56.2 units in 100 ml. van den Bergh direct delayed the laevulose tolerance test showed liver damage. Also there was porphyrinuria (742 γ ether-soluble porphyrin in a 24-hours specimen of urine (normal daily excretion is 20–50 γ). The stool contained 31.4 γ per dry gm weight (normal 20 γ). At

this stage he was given 50 mgm. nicotinic acid, 1 mgm. riboflavin 2 cc. crude liver extract 5 mgm. thiamin in 10 cc. of 10 per cent. calcium-gluconate every other day with the result that immediate improvement took place with cessation of abdominal attacks. The urine, however still contained increased porphyrin.

The genesis of this case is a problem for discussion. The main point in its citation lies not so much in the fact of the diagnosis of carcinoma but in the situation of the lesion and the biochemical changes thereby produced. It may well be an example of post-operative jejuno-ileal insufficiency (BENNETT & HARDWICK) or post-operative symptomatic sprue. It nevertheless clearly demonstrated that the changing over from a pancreatic to "sprue-like" steatorrhoea is closely related to increased porphyrin production and excretion and it gives point to the intimate interconnection of grave intestinal disturbance and steatorrhoea, which have already been set forth on biochemical grounds. Three similar cases^{10, 11} have been found in the literature.

DISCUSSION

(An attempt to correlate the complex physiological changes with the conception of the functional pathology of sprue.)

The primary cause which may eventually lead to complete dysfunction of the small intestine may not necessarily be very serious. It is well-known from routine X-ray examinations that in acute, as well as in subacute enteritis the motility of the small intestine especially that of the jejunum may be increased for days. Recovery may be complete because the small intestine has an ample range of compensatory mechanism at its disposal, but on the other hand, it may increasingly affect the whole mechanism of absorption, so that split fat in excess is always present in the stools in quiescent periods without diarrhoea. The development of the full sprue syndrome probably depends on the coexistence of a number of dyskinesias and dysfunctions which may not affect the individual seriously for a long time. The aetiology of the sprue syndrome has been reviewed critically by BLANSON-BAHR (1941) who considers that gastro-duodenal insufficiency is responsible for pernicious anaemia, jejuno-ileal insufficiency is responsible for the sprue syndrome and ileo-colic insufficiency for pellagra. He has also stated that neither achylia gastrica nor hypochlorhydria is present as an invariable rule in sprue. CASTLE *et al.* (1935) found the intrinsic factor present in sprue even in cases with complete achlorhydria. Although it appears that gastric acidity has no definite bearing on the progress of the disease disturbances of gastric secretion are too frequent in sprue to be completely disregarded.^{10, 11}

For the purpose of the present hypothesis it may be permissible to stipulate that there exists an additional unknown factor in gastric secretion. It may be mentioned that in addition to gastrin (identical with histamine) a second gastric hormone has been prepared¹² from the acid extract of the pyloric mucosa, which exerts no effect on blood pressure pancreatic or bile secretion but when absorbed by the small intestine produces a gastric flow rich in acid, but poor in pepsin. The next link appears to have been provided by LAURENT and SINCLAIR (1938) who showed that vitamin B₁₂ might be destroyed in the stomach in achlorhydria moreover this might also take place in the gastric and duodenal juices incubated *in vitro* of patients with achlorhydria.

(SINCLAIR 1939 MELNICK *et al* 1941) or conversely that the same might happen even in *acid* juice in the presence of haemin (MAHLO 1938 SCHRÖDER 1939)

The normal and natural stimulus for the contraction of the villi and absorption is *villikinsine* which is extractable from the intestinal mucosa by hydrochloric acid, so that it can now be stipulated with some confidence that some factor in the gastric juice usually combined with hydrochloric acid is jointly responsible not only for the movements of the villi but also for the preservation of vitamin B

The permeability of the epithelium of the villi is also an important factor For the water and crystalloids physicochemical laws of diffusion and osmosis suffice in insoluble substances the principle of hydrotropy was introduced (NEUBERG 1916) The principal agents in this respect are bile acids and their salts (VERZAR, 1931)

The main chemical reaction for the maintenance of the gradient of absorption is *phosphorylation* The catalysts responsible for the motility of the villi and also for diffusion, osmosis, hydrotropy and phosphorylation are the oxidation-reduction enzymes—the cytochromes and in case they are rendered inactive by absence of available iron the yellow respiratory-co-enzyme system which is composed in turn of phosphorylated riboflavin and phosphorylated nicotinic acid. *It is tentatively submitted that in this evidence lies the importance of the vitamin B group in the sprue syndrome and allied states* This process of substitution between these two catalyst systems in absence of available iron leads to a gradual depletion of the vitamin B group reserves It may be assisted by other as yet unknown systems and their interaction may be so perfect for a long period that there may lie the well founded clinical observation of the slow development of sprue.

The question now arises as to what conditions may produce a lack of iron in cellular metabolism. It may be due to excessive intestinal putrefaction In this connexion SEYDERHELM (1922) DIXON *et al* (1925) obtained improvement in pernicious anaemia by treatment with ileostomy followed by colonic irrigation which mitigated the pathological flora of *Bact coli* Experimental intestinal strictures produced macrocytic anaemia if excessive bacterial growth prevailed above the strictures. HORSTER (1935) found that under these circumstances macrocytic anaemia, indicanuria and liver damage could be prevented by injections of liver extract or by feeding with trichlorocresol. RHODES and MILLER (1938) found that a similar anaemia could be produced by feeding on indol and skatol, but the anaemia could be prevented by liver extracts. As an explanation it is found that certain strains of *Bact coli* are able to de-aminize amino-acids especially tyrosine in the small intestine the resulting tyramine when injected produces macrocytic anaemia and liver damage. It is known that the liver principle (LEITNER, 1928) exerts a detoxicating effect on the liver The acid gastric juice is responsible for checking the migration of the bacterial flora to the upper part of the small intestine but when reduced or absent as in sprue intestinal putrefaction is bound to be increased KÄMMERER (1924 1929) has shown that intestinal bacteria are capable of producing porphyrin from haemoglobin from myoglobin and even from chlorophyll and that the appearance of porphyrins reduces the production of bile

In the sprue syndrome the excretion of bile acids and salts is reduced serum bilirubin raised and the glucose tolerance curve is flat All

these taken together may be expression of severe liver damage so the loss of detoxicating power of the liver may be responsible for the macrocytic anaemia.

An increased porphyrinuria has been shown to exist in cases of non-tropical sprue^{29, 30} and also in the special instance quoted in this paper. It is therefore suggested that similar changes might be found in all cases of tropical sprue if investigated from this viewpoint. It is all the more suggestive as an increased porphyrin excretion in endemic pellagra has been confirmed by many workers^{7, 22, 8} and similar findings have been repeatedly made in pernicious anaemia during relapse (DOBNER and RHOADS 1940).

In conclusion the following views are expressed as an explanation of the chain of events involved in the mechanism of the sprue syndrome.

Primary cause.

- 1 Breakdown of normal absorption in the upper part of the small intestine (due to different causes).

Secondary causes.

- 2 Deficiency in gastric secretion and hydrochloric acid necessary for coordination of intestinal functions.
- 3 Achlorhydria, which affects motility of the villi and decreases the vitamin B content of food.
- 4 Stagnation and malabsorption, which produce abdominal discomfort and flatulence.
- 5 As a consequence of achlorhydria, migration and multiplication of intestinal flora (*Bact. coli*).
- 6 Consequent breakdown of iron metabolism in relation to bone marrow and haemoglobin, producing megalocytic anaemia.
- 7 Haemoglobin metabolism perverted to increasing amounts of porphyrin.
- 8 Bilirubin excretion reduced. bilirubin serum content increased.
- 9 Following liver damage bile acids decreased in turn reducing hydrotropic and fat absorption.
- 10 Unresolved fatty acids in the small intestine forming insoluble calcium salts thus affects the bones and then the whole electrolyte equilibrium. Development of this stage is slow and may last years.
- 11 Increasing liver dysfunction excessive porphyrinuria whereby Meissner's plexus is paralysed. motility of villi is disturbed. Breakdown of cytochrome-enzyme system and steatorrhoea.
- 12 Owing to already present dysfunction an acute vitamin B deficiency is thereby produced.

The clinical manifestations resulting from this successive chain of events may eventuate in sprue or possibly in pellagra.

I am greatly indebted to Lord HORDER, Sir Charles WILSON and Mr R. S. CORRETT for their advice and help with the case. My thanks are also due to Dr S. COCHRANE SHANKS for the X-ray investigations, to Drs C. RIMINGTON and Chas H. GRAY for the biochemical investigations, to Sir Arthur HURST, Drs L. J. HARRIS, H. A. KREBS, R. A. McCANCE and J. YUDKIN for much valuable advice and in particular to Sir Philip MARSON BARR for help and encouragement in the preparation of this paper.

References

- ¹ ALESSANDRINI P. (1934) *Arch. Ital. mal. app. digest.* 2, 631
- ² ALVAREZ W. C. (1940) An introduction to gastro-enterology. London
- ³ BARKER, W. H. and HUMMEL, L. E. (1939) *Johns Hopk. Bull.* 64, 215
- ⁴ BARNES R. H. WICK, A. N. MILLER, E. S. and MACKEY E. M. (1939) *Proc. Soc. Exp. Biol. & Med.*, 40, 651
- ⁵ BARI, U. (1934) *Clin. Med. Ital.* 65, 241
- ⁶ BAYLISS W. M. and STARLING E. H. (1901) *J. Physiol.* 26, 125
- ⁷ BUCKH W. ELLINGER, P. and SPIES T. D. (1937) *Quart. J. Med.*, 6, 305
- ⁸ BENNETT T. I. and HARDWICK, C. (1940) *Lancet* 2, 381
- ⁹ BONFORD R. R. and RHOADS C. P. (1941) *Quart. J. Med.* 10, 175
- ¹⁰ BRUCK, H. M. and WIRM R. (1940) *J. Physiol.* 98, 375
- ¹¹ CAPELLI, F. (1936) *Med. del Lavoro* 27, 97
- ¹² CASTLE W. B. RHOADS C. P. LAWSON H. A. and PAYNE G. C. (1935) *Arch. Int. Med.* 58, 627
- ¹³ CHANDLER, F. G. HARRISON G. H. and RIMINGTON C. (1939) *Brit. Med. J.* 2, 1173
- ¹⁴ CRAMER, W. (1928) Fever, heat regulation, climate and the thyroid-adrenal apparatus. London.
- ¹⁵ — and LUDFORD R. J. (1925) *J. of Physiol.* 60, 342.
- ¹⁶ DIXON C. F. BURNS J. G. and GIFFIN H. Z. (1925) *J. Amer. Med. Assoc.* 85, 17
- ¹⁷ DOBRINGER K. and RHOADS C. P. (1940) *Physiol. Reviews* 20, 416
- ¹⁸ ELLINGER P. and DOJMI L. (1935) *Chem. & Ind.* 507
- ¹⁹ EULER H. and SCHLENK, F. (1937) *Z. f. physiol. Chem.* 248, 64
- ²⁰ FAIRLEY N. H. (1930) *Trans. Roy. Soc. Trop. Med. & Hyg.* 24, 131
- ²¹ — and KILNER, T. P. (1931) *Lancet* 2, 1335
- ²² — and MACKIE, F. P. (1937) *Brit. Med. J.*, 1, 375
- ²³ FRÄNKEL, E. (1924) *Virchows Arch.* 248, 125
- ²⁴ FRAXER, A. C. (1940) *Physiol. Rev.* 20, 561
- ²⁵ GARROD A. E. (1893) *J. of Path.* 1, 187
- ²⁶ GOLDEN ROSE. (1941) *Radiology* 38, 262.
- ²⁷ GÜNTHER, H. (1922) *Erg. allg. Path. und path. Anat.* 20, 607
- ²⁸ HANSEN K. (1937) *Dtsch. Med. Wschr.*, 63, 849
- ²⁹ HARRIS S. (1941) *Clinical Pellagra*. London.
- ³⁰ HORSTER, H. (1935) *Z. f. exp. Med.* 95, 514
- ³¹ HOTZ H. W. and ROHR, K. (1938) *Erg. inn. Med.* 54, 174
- ³² HURST A. F. & KNOTT F. A. (1930) *Quart. J. Med.* 24, 171
- ³³ — (1941) *Brit. Med. J.* 2, 657
- ³⁴ — (1942) *Guy's Hosp. Rep.* (in press)
- ³⁵ JECKELM E. (1939) *Virchows Arch.*, 308, 393
- ³⁶ KIMMERER, H. (1924) *Dtsch. Arch. klin. Med.* 145, 257
- ³⁷ — (1929) *Verh. dtsch. Ges. inn. Med.*, Wiesbaden.
- ³⁸ KNILIN D. (1929) *Proc. Roy. Soc.* 104B, 206
- ³⁹ — and HARTREE, E. F. (1939) *ibid.* 127B, 167
- ⁴⁰ KENDALL, E. C. (1938) *Proc. Staff Meet. Mayo Clin.* Rochester 13, 379
- ⁴¹ KLINGE K. (1931) *Mineralstoffwechsel*. Leipzig
- ⁴² KOKAR, E. and LUDWY G. (1930) *Pflügers Arch.* 225, 421
- ⁴³ — (1935) *ibid.*, 236, 168
- ⁴⁴ — (1938) *Quart. J. Exper. Physiol.*, 28, 15
- ⁴⁵ KOMAROW S. A. (1938) *Amer. J. Physiol.*, 123, 121
- ⁴⁶ KREBS H. A. (1940) *Biochem. J.* 34, 460 and 775
- ⁴⁷ LAURENT L. P. E. and SINCLAIR, H. M. (1938) *Lancet* 1, 1045
- ⁴⁸ LEITNER, Z. A. (1928) *Haematologica* 10, 1
- ⁴⁹ LEFORS M. J. and GOLDEN ROSE. (1941) *J. Amer. Med. Assoc.*, 117, 918
- ⁵⁰ LOKE R. F. (1932) *Science* 76, 420
- ⁵¹ MCCANCE, R. A. and WIDDOWSON E. M. (1942) *J. Physiol.* 101, 44
- ⁵² MACKIE, F. P. and FAIRLEY N. H. (1934) *Trans. Roy. Soc. Trop. Med. & Hyg.* 27, 340
- ⁵³ MAHLO A. (1938) *Dtsch. Med. Wschr.* 64, 496.
- ⁵⁴ MANON BARR. (1915) A report on researches on sprue in Ceylon. Cambridge University Press.
- ⁵⁵ — (1940) *Lancet* 2, 317
- ⁵⁶ — (1941) *Trans. Roy. Soc. Trop. Med. & Hyg.* 34, 347
- ⁵⁷ — (1941) *Trop. Dis. Bull.* 58, 123
- ⁵⁸ MARKOFF N. (1940) *Schweiz. Med. Wschr.* 70, 1137
- ⁵⁹ MARTIN G. J., THOMPSON M. R. and CARVAJAL FORERO J. (1941) *Amer. J. Digestive Dis.* 8, 290

- 21 MELNICK, D ROBINSON W D and FIELD H. (1941) *J Biol Chem* 122, 49.
- 22 MENDLINER J and ROSENTHAL M. L. (1935) *Lancet* 2, 764
- 23 MODERMAN E. (1937) *Quart. J Med* 8, 119
- 24 NEUBERG, C. (1916) *Bioch. Z.*, 76, 103
- 25 NEVILL, H. E. (1928) *Pflügers Arch.*, 219 554
- 26 PETERS, R. A. (1940) *Nature* 146, 387
- 27 PIJOUAN M. and OBERO S. A. (1937) *Proc Soc Exp Biol. & Med.*, 36, 187
- 28 POCK STEIN P. (1937) *Genetish. Techr Nidh. Indus* 23, 1714
- 29 RAD L. (1940) *Lancet* 2, 647
- 30 REITLINGER, K and KLEIN, P. (1928) *Arch Exp Path Pharmac.*, 127 277
- 31 RHOADS C P and MILLER, D K. (1938) *J Exp Med* 67 273.
- 32 RIMINGTON C. (1936) *Onderstepoort J Vet. Sci.* 7 567
- 33 — (1939) *Proc. Roy Soc Med* 32, 1268
- 34 — and HEDMANN A W. (1939) *Bioch. J.*, 33, 980
- 35 RYLE, J A. (1924) *Guy's Hosp Rep.*, 74 1
- 36 SCHRODER, H. (1939) *Klin Wochr.*, 18, 145.
- 37 SEYDERHELM, R. (1923) *Erg inn. Med* 21, 261
- 38 — LEHMANN W and WICKELS, P. (1927) *Krankheitsforsch* 4, 203
- 39 SONCLAIR, H M. (1930) *Proc. Roy Soc Med.*, 23, 812
- 40 — (1941) *Postgrad Med J* 17, 3
- 41 SKELL, A M and CAMP J D. (1934) *Arch Int. Med.*, 53, 615
- 42 SPIES T D and PAYNE, W. (1933) *J Clin Invest* 12, 229
- 43 STEIN C G. (1939) *Cold Spring Harbor Symp* 7 312
- 44 SYDENHILCKER, V P. (1941) *Ann. Int. Med* 14, 1489
- 45 TRAYNER T E H. (1922) *Non-tropical Sprue* London.
- 46 — (1935) *Quart J Med* 4, 359
- 47 VANBOTTI, A. (1935) *Z. exp Med* 67, 377
- 48 — (1936) *Habert Med Acta* 2, 663
- 49 — (1937) *Porphyria and Porphyrinkrankheiten*. Berlin.
- 50 VERRILL, F. (1931), *Erg Physiol*, 23, 391
- 51 — (1936) *Die Funktion der Nebennierenrinde* Basel
- 52 — and LAKEY F. (1936) *Pflügers Arch* 237 473.
- 53 — and McDONOGALL, E J. (1936) *Absorption from the Intestine* London.
- 54 WALDENSTRÖM, J. (1937) *Act Med. Scand Suppl* 82
- 55 WARBURG, O and CHRISTIAN W. (1933) *Bioch. Z* 257 492.
- 56 — (1936) *Ibid* 238, 150

SUMMARY OF RECENT ABSTRACTS *

VII HELMINTHIASIS.

General.

In a review of the mechanism of acquired immunity in helminthic infections TALLAFERRO (p. 110) points out that the evidence indicates that the humoral and cellular mechanisms are fundamentally identical with those which operate against other infections and against non-infective antigenic agents. The immediate factors are humoral, and cellular co-operation is secondary. Precipitins which are formed by the host against materials which pass out of the mouth, anus and excretory pore of intestinal nematodes give rise *in vivo* to visible precipitates and are undoubtedly important in the allergic reactions of the host. They may also affect the immobilization, delay in development, stunting prevention of food assimilation and inhibition of enzymatic activity of the parasite though these actions have not been proved. In infections with larval tapeworms two types of

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1941 Vol. 28. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

immunity are developed one early and the other late. Antibodies of the early type can be absorbed with freshly ground worm substance but those of the late type cannot and it is probable that the antigens stimulating the late type are liberated from the living parasite, but occur if at all in insufficient quantities in freshly ground worm material.

MAPLESTONE and BHADURI (p 374) have studied the helminth parasites of dogs in Calcutta. Of the worms which infect man *Trichostrongylus colubriformis* was found, the first occasion on which it has been recorded in a carnivore. *Heterophyes heterophyes* and *Opisthorchis felis* were also found but though common in man in other parts of the world they are not common in Calcutta, since the Indians are protected from them by the fact that they rarely eat uncooked fish. The same applies to *Gnathostoma spinigerum*. By far the most important parasite of the dog in Calcutta is *Echinococcus granulosus* the incidence of which is high in city dogs. *Taenia ovis* was not found in the dogs and its cysticercus was not identified in mutton, so that it is unlikely that this worm is a cause of human cysticercosis a condition relatively common in British troops in India.

CHANG and LIN (p 375) found infection with *Ascaris lumbricoides* in a high proportion of persons examined in Chengtu and considerable hookworm infection in soldiers of the same area. *Clonorchis sinensis* was found there for the first time in man, though it is common in cats in this area. *Fasciolopsis buski* and *Schistosoma japonicum* were also encountered.

GUNewardENE (p 38) discusses the formation of phosgene from tetrachlorethylene this apparently only occurs on exposure to light. He emphasizes the danger of testing for phosgene by smell it is a dangerous lung irritant even in small amounts.

Trematodes

Schistosoma infections—Hitherto it has been thought that the littoral of Algeria has been free from indigenous infection with *S. haematobium* though it is known to occur in Morocco. SABADINI and IMBERT (p 39) now report an outbreak in Senegalese soldiers. Europeans and natives in Saint Aumé (Algiers). *Bulinus contortus* has been found in the irrigation canals of the district. LABBATE (p 40) reports urinary schistosomiasis from northern Goggiam Abyssinia probably acquired from the water of Lake Tana or its affluents. VERMootEN (p 376) points out that schistosomiasis is endemic near Johannesburg and in Pretoria and other places at altitudes which have erroneously been regarded as free from danger. It is there apparently almost entirely an infection of the urinary system and the author stresses the importance of a final cystoscopic examination in the assessment of cure. Surgical treatment is disappointing so long as infection is active.

KRAKOWER (p 376) has investigated the effects of temperature light pH and solutions of salt on the cercariae of *S. mansoni*. In rain water the normal life span is 24–48 hours exceptionally 72 at 5°–6°C life may be prolonged to as much as 14 days but the cercariae are motionless freezing is rapidly fatal. Up to 34°C. they live as long as at room temperature but increasing warmth above this increases mortality all being killed in 30 minutes at 45°C. Strong electric light induces activity and shortens life presumably the cercariae become worn out. Ultraviolet light and direct sunlight are

both fatal, but the latter effect may be due to heat. The certaria withstand pH variations from 4.6 to 10 further extremes are fatal. Sodium chloride in 1.5 per cent. solution is quickly fatal.

MARTENS (p. 42) prefers the name *Australorbis glabratus* for the intermediate host of *S. mansoni* in America. Synonyms are given, including the name *Planorbis gueddeouensis*.
BRUMER (p. 41) describes the progress of infection of *Australorbis glabratus* with miracidia of *S. mansoni* confirming the opinion expressed by LUTZ that the lesions observed in the tentacles are caused by the developing sporocysts.

SCOTT (p. 377) estimates that there are about 30,000 persons in Venezuela infected with *S. mansoni* and states that the infection is practically coextensive with the distribution of *Australorbis glabratus* the snail host. It occurs only where irrigation is in use though the snails are not found exclusively in irrigation water. The infection is chiefly found in the valleys of the mountains along the northern coast elsewhere the snail host is not common, and such foci as exist are small and local. In many of the endemic regions more than 90 per cent of males aged over 10 are infected, while the proportion of females is slightly lower. Elimination of the infection by snail control is probably possible.

MEIRA and AMARAL (p. 375) report on the worms found in an investigation of labourers at São Carlos, Brazil. Hookworm infection was fairly common and *S. mansoni* was found in a number of cases.

Discussing bilharzial affections of the appendix, MOHAMED (p. 40) draws a distinction between the bilharzial appendix, in which eggs are found in the tissues, with infiltration by active cells of the reticulo-endothelial system, and bilharzial appendicitis, in which bacterial infections are superimposed. He points out that in his autopsy specimens the infestation was never confined to the appendix, but was usually severe in the intestine or urinary tract or both. On the other hand, 17 per cent. of a series of appendices removed at operation were normal, and he considers that the symptoms which led to operation were probably caused by bilharzial infection of the intestine or urinary tract, and that permanent cure could have been effected by antimony or other anthelmintic treatment, after infection had been diagnosed by the usual means.

He further states that bilharzial infection of the gall bladder does not occur in isolated or primary form and that secondary bacterial infection may take place. The proper treatment of the worm infestation is by drugs. Ova may be found in the submucosa or muscular layer or in the subserous coat but he does not consider that eggs may form nuclei for gallstones. In view of the fact that 21.9 per cent. of gall bladders removed after the diagnosis of chronic cholecystitis were normal in appearance he advises that when investigations in such cases point to bilharzial infection, the patient should be treated with drugs. In this way he believes that most cases would be permanently cured.

ROBERTSON (p. 42) reports endemic infection with *S. japonicum* in the West Yunnan plain where infected snails of the *Kaiyama* group were found in irrigation ditches.
YAO (p. 43) describes a focus of *S. japonicum* infection in the Kwangsi Province of southern China, in which 55 per cent. of a random sample of the population were infected. *Oncomelania* snails (but not

nosophora or *lupensis*) were collected from streams and irrigation ditches and 7.8 per cent harboured the cercariae which were infective for experimental rabbits.

WU (p 43) has shown that in China the following animals have been found infected with *S japonicum*—sheep, goats, house rats, dogs, cats, oxen, buffaloes and horses. He thinks that field rats may be infected in the endemic areas and although pigs have not been found naturally infected, they are susceptible to experimental infection. He notes that in the Yangtze delta the faeces of sheep and goats are used to fertilize the land, and points out that this practice constitutes a risk to man. Control of infection in man and animals must take into account these reservoir hosts.

GARCIA *et al* (p 43) found eggs of *S japonicum* in the tissues of a chronic ulcer of the leg of a child in the Philippines. Eggs were also present in the faeces.

BRACKETT (p 44) describes the features governing the occurrence of schistosome dermatitis in Wisconsin. He points out that this condition is not serious. CORT *et al* (p 44) give reasons for the belief that the cause of schistosome dermatitis at the bathing beaches of Michigan is *Cercaria stagnicolae*, a parasite of the snail *Stagnicola emarginata*.

BRACKETT (p 378) gives an account of the pathology of schistosome dermatitis as seen in portions of excised skin. The cercariae do not apparently penetrate beyond the epithelial layer. He has exposed his own skin to the cercariae (*C elvae* and *C stagnicolae*) on many occasions and notes that it has become increasingly sensitive; the later exposures producing almost immediate urticarial response. In persons who show no reaction to the cercariae it is thought that they do not enter the skin.

The same author (p 379) discusses the biology of the snail hosts of the cercariae of schistosome dermatitis in Wisconsin. The incidence of the dermatitis is determined by the life history of the snails. *Stagnicola emarginata* dies off about August and *Physa parkeri* at an earlier season. At these times the infection begins to disappear.

Other trematodes—KOMIYA and TAJIMI (p 44) describe the structure of the cercaria and metacercaria of *Clonorchis sinensis*. In the Shanghai area the first intermediate host is *Bithynia striatulus* and in the same area two additional second intermediate hosts have been confirmed, *Leucogobio polytaenia* and *Squaliobarbus curriculus*. HSU and LI (p 380) show that *Bithynia longicornis* is a first intermediate host of *C sinensis* in the Canton area, which is an endemic centre of infection.

Invasion of the pancreas by *C sinensis* has been found quite frequently in Japan and GALLIARD *et al* (p 45) now report two cases from Tonking. The clinical findings and pathological changes are described. Both patients died.

SANDGROUND (p 382) reports that he found a single worm of the genus *Plagiorchis* in the contents of the small intestine of a native of Java. This is the third occasion on which a trematode of this genus has been found in man. He has named it *Plagiorchis philippinensis* because the first record came from the Philippines.

WU (p 46) gives an account of the geographical distribution of paragonimiasis in China and of the reservoir hosts—rat, dog, cat, wild cat, leopard and tiger. Of the intermediate hosts *Melania* and *Potamon* live in mountain streams, *Assiminea* and *Sesarma* in delta regions. The eating of crabs is common and in many places they are not cooked.

across the island from sea to sea. The northern part and most of the central portion has soil composed of heavy clay which is more or less impermeable. The soil of the southern portion is light mostly covering limestone here the drainage is good.

The population is composed of 297 000 whites and 111 000 negroes.

Nearly all schools in the Province were visited. 7 068 children were examined for enlargement of the spleen, and blood examinations were made of 3,374. The latter included all children having enlarged spleens and so was to that extent a selected group. The percentage with enlarged spleens was 18 for whites and 7 for negroes. Of blood films examined 0.5 per cent. contained parasites among the white children 1 per cent. among the negroes. The spleen indices in different municipalities varied from 7 to 32. The areas of highest malaria endemicity are those with the poorest natural drainage. In Camaguey city endemic malaria is confined to the outskirts where borrow-pits supply facilities for mosquito breeding.

P. vivax was found three times more frequently than *P. falciparum*. *P. malariae* was not seen. Low parasite rates with considerable splenomegaly indicate that malaria has not recently been active. The last malaria epidemic in the Province was in 1934. The abandonment of the practice of importing labour for the cane harvest has probably reduced epidemic malaria in Cuba in recent years. *A. crucians*, *A. vestitipennis* and *A. albimanus* were found breeding; the first two were relatively rare. *A. albimanus* is the important vector.

The malaria conditions are similar to those found by the authors in Oriente Province [see this *Bulletin* 1940 Vol. 37 p. 684].

Norman White

CARR (Henry P.) & MELÉNDEZ (Joaquín Fernández). Malaria Recconnaissance of the Province of Pinar del Río in Cuba.—*Amer. J. Trop. Med.* 1942 Jan. Vol. 22 No. 1 pp. 51-61. With 1 map.

This is a further instalment of the report on the malaria survey of the Republic of Cuba. Pinar del Río Province is the most western of the six political divisions of the Island. The Organ mountains lie almost wholly in this Province, dividing it into a narrow northern and a broader southern coastal plain; the maximum breadth of the latter is some 20 miles. Creeks and rivers are numerous in the south. As in other provinces investigations were largely confined to school-children [see summary of report on Camaguey Province above].

The population of Pinar del Río is 343 482, of whom 270,547 are white, 72,835 are negro. The spleen rate of 13,830 white children was 14 and of 3 025 negroes 3. Malaria parasites were found in only 33 films. 7 407 were examined. *P. vivax* was found in 20, *P. falciparum* in 13. The highest degree of malaria endemicity is found in the portion of the coastal plain which lies at a lower elevation than 100 feet. Epidemic malaria may occur; there was an epidemic in 1934 attributed to unusually heavy rainfall and bad economic conditions following the depression.

Anopheline larvae collected were identified as *A. crucians*, *A. vestitipennis*, *A. gabrieli* and *A. albimanus*. *A. albimanus* predominates throughout the coastal area and is most prevalent at elevations of 100 feet or less. It is most numerous during the season of most active malaria transmission.

A. vestispennis may be of some importance as a malaria vector in some parts of Cuba but *A. albimanus* is the important vector of that country
 Norman White

CARR (Henry P.) MELÉNDEZ (Joaquín Fernández) ROS (Alberto) & MELÉNDEZ (Aristides Fernández) Malaria Reconnaissance of the Province of Havana in Cuba.—*Amer J Trop Med* 1942 Jan Vol. 22 No 1 pp 63-71 With 1 map

Havana is the smallest of the six provinces of Cuba. It lies between the Pinar del Rio and Matanzas Provinces. It covers 3,254 square miles and is divided into 26 municipalities or counties. The total population is 985,500 and of these 774,518 are white 210,982 negro or mixed. Most of the Province is flat or undulating. There are a few hills in the west outlying hills of the Organ mountains of Pinar del Rio and there are a few hills 300 to 400 feet high east and south-east of Havana city. The plain has a sublayer of porous limestone. The soil is deep red Matanzas clay fine and permeable. Surface drainage is excellent ponds and lakes are infrequent. Mangrove swamps along the north and south coasts if free communication with sea water be prevented by sandbars may produce *A. albimanus* in abundance. The flat valley of the Almendares River has comparatively unpervious soil on which rain water and irrigation water may collect and provide breeding facilities for *A. albimanus*. Old borrow pits that have become silted and puddled may contain water for considerable periods during the rainy season.

Nearly every school in the Province outside Havana city was visited. The number of children examined was equivalent to 2.2 per cent. of the total population outside the city and in the city to 1 per cent. of its population. The spleen rate of 15,940 white children was 9 of 3,248 negro children 3. Only two positive blood films were found among 9,982 examined both these were from children living near the Almendares River valley. Very few schools had spleen rates as high as 21 per cent. There is very little endemic malaria in Havana Province at present this is probably explained by the porous nature of the soil and subsoil. As in other Provinces of Cuba *A. albimanus* is the dominant species found breeding. Breeding places other than the three types mentioned above were scarce. A few larvae of *A. crucians*, *A. vestispennis* and of *A. grahami* were also found.

Norman White

GORDON (R. M.) DAVEY (T. H.) & PEREGRINE (E. P.) A Mechanical Trap for sampling Mosquito Populations entering Houses.—*Ann Trop Med & Parasit* 1941 Dec. 31 Vol. 35 No 2 pp 269-276 With 3 figs. [19 refs.]

After reviewing the methods that have been used to estimate the numbers of mosquitoes entering a house during the night the authors describe with full constructional details a new type of trap designed to be fitted into a single open window of a room. In principle the trap consists of a screen of mosquito-netting in the form of a roller towel held taut between an upper and lower roller. The upper roller is kept revolving by a small motor worked from a 12 volt storage battery and as the netting is carried slowly upwards at a rate of 5 ft per minute the mosquitoes alighting on it are swept off into a small

container from which they can be collected in the morning. The ability of the trap to catch mosquitoes has been proved, but it has not yet been given an extensive trial. I. B. Wigglesworth

LEESON (H. S.) The Occurrence of *Anopheles marleri* in Syria.—*Bull Entom Res.* 1942. Apr. Vol. 33 Pt. 1 pp 35-37

In this paper besides a description of *A. marleri* is given a useful key to the adults and larvae of the seven species of *Anopheles* so far found in Syria. *A. sacharovi*, *A. hyrcanus*, *A. superpictus*, *A. sergenti*, *A. claviger*, *A. marleri* and *A. algeriensis*. C. W.

SICART (Marcel) Contribution à l'étude des anophèles de Tunisie. Présence de *Anopheles (A.) claviger* (Meigen 1854) (*A. claviger* in Tunisia).—*Arch Inst Pasteur de Tunis.* 1941 Dec. Vol. 30 No. 3-4 pp 287-290 With 1 fig

RAMOS (A. da Silva) & URTI (Ovidio) Notas sobre os anofelinos de São Vicente e suas imediações (The *Anopheles* of São Vicente).—*Arquivos de Hig e Saúde Pública* São Paulo 1940 Sept. Vol. 5, No. 10 pp 55-61 With 4 figs. on 2 plates. English summary (5 lines).

PARISE (N.) & LOCKEY (G.) Recherche sulla malaria cronica. [Research on Chronic Malaria].—*Riv di Malarologia* Sez. I 1941 Sept.-Oct. Vol. 20 No. 5 pp 301-308. With 3 figs. (1 coloured) on 1 plate [25 refs.] French summary (8 lines)

The hypothesis that malaria is primarily a disease of the reticulo-endothelial system was the basis of the observations described in this paper which were intended to throw light on the nature of chronic malaria. Seventy-six cases of chronic malaria were studied in 60 the disease was latent the remainder were relapsing cases. Nearly all the patients had contracted malaria in Africa all had been intensively treated with quinine. For the most part the study was confined to an examination of material obtained by spleen puncture all the patients had enlargement of the spleen. In five cases sternal puncture was carried out, and in two the liver was punctured.

In all cases there was evidence of hyperactivity of the reticulo-endothelial system this varied in degree and was most marked in the few cases in which malaria parasites could still be demonstrated. There was a great increase in very young forms of blood cells. There was evidence of marked phagocytic activity endothelial cells englobing detritus of various kinds, red cells, leucocytes, malaria pigment and sometimes parasites, were commonly seen. No non-pigmented free forms of malaria parasite were found or rather none that could be certainly identified as such. The authors stress the difficulty of the search for such non-pigmented forms and the possibilities of error in their identification. Norman White.

MAILYAN (L. M.) (Oedema of the Lungs of Malarial Origin).—*Soviet Med* Moscow 1941 No. 4 pp 12-13.

The author notes that the respiratory organs are rarely affected in malaria, and refers to the few cases of pneumonia ascribed to malaria which have been reported in the literature. He gives an account of two of his own cases, in which pulmonary oedema appeared during

attacks of subtertian malaria subsiding after anti malarial treatment. In neither case was any other cause of the oedema found and the close association of the two conditions in onset and course is strong evidence that they were causally connected.

The first patient was a man of 18 who had lived in a non malarious area but had recently travelled through a malarious region near Baku he was comatose on admission *P. falciparum* was found in his blood there was intense dyspnoea, with bubbling râles impaired percussion note at the bases frothy sputum but a clear X ray picture. The chest condition cleared completely after quinine atebryn and plasmoquine treatment. The second patient was aged 16 his history and symptoms were much the same and the condition cleared after the same treatment.

It is noteworthy that both patients were young and that in both cases the pulmonary oedema accompanied the first attack of malaria it is therefore possible that the oedema was associated with a non-immune state. The effect of anti-malaria treatment was striking

V C Robinson

ZIKREYEV (V V) [Trophic Disturbances in Malaria.]—*Sovet Med* Moscow 1941 No 4 p 14

Prolonged malarial infection leads to progressive anaemia and increasing melanosis due to uptake of melanin by the cells of the reticulo-endothelial system. This lowers the biological stability of the tissue and renders it especially vulnerable to exogenous stimuli. The author describes certain skin conditions in which there were trophic disturbances which he ascribes without doubt, to malaria. One was a case of indolent ulcer of the heel three were of gangrene of the penis or scrotum there was evidence of malaria in all. Anti malarial treatment appeared to produce a definite effect on all these ulcers which healed in three to four weeks.

The author mentions the case of a girl who had a facial disfigurement due to an accident. Skin grafting had been attempted unsuccessfully until it was noticed that attacks of malaria followed each operation. The patient was therefore given quinine before each succeeding operation with the result that the grafts took and the whole area was successfully covered.

V C Robinson

GRACHEV (Y S.) [Combined Treatment of Malaria with Akrichin and Biochinol.]—*Sovet Med* Moscow 1941 No 4 p 16

Akrichin [atebryn] by the mouth administered alone is unsatisfactory in malaria since although it cuts short the attack it does not prevent recurrence. In 1939 akrichin hydrochloride hypodermically was tried at Kuibyshev but again the attacks recurred.

A combined course of akrichin and biochinol was therefore worked out as follows akrichin 0.1 gm *per os* was given three times a day for five days on the fourth seventh and tenth days injections of biochinol 0.3 gm were given.

Biochinol contains iodine quinine and bismuth and forms a depot from which quinine and iodine are gradually released into the circulation. At Kuibyshev the treatment has been successful both in cutting short the malarial attack and in preventing recurrence

V C Robinson

LOPATIN (G M) [Diagnosis and Laboratory Investigation of Malaria in Children.]—*Trans Kuzbyshev Mili Med Acad. Red Army* 1940 Vol. 4 pp 203-213 [In Russian.]

This paper deals with the peculiarities of malaria in children and their influence on diagnosis. It is pointed out that the diagnosis of malaria in children presents great difficulties owing to variations in the clinical course and atypical manifestations. For example, during attacks in small children it is easy to overlook the cold stage, since it is not always pronounced and may even be absent. In many children rigor is accompanied by vomiting, while in some cases there may be involuntary micturition. In the hot stage the temperature curve may be irregular, pyrexia appearing too early or too late while its duration is either too short or too long. These irregularities may lead to wrong diagnosis and to confusion with other febrile conditions. As to the sweating stage it is frequently absent or inconspicuous in young children. The importance of spleen enlargement in malaria is diminished owing to the frequency of splenomegaly in children due to other causes (rickets, Banti's disease, leishmaniasis, etc.). Though the only infallible method of diagnosis is the finding of the parasites in the blood, these could not be found in many cases of undoubted malaria, the parasitic index in children attending the clinic being only 65. Among changes in the blood, variation in the number of platelets appears to be significant. It falls considerably in the course of the disease (sometimes to 25 000) but gradually increases during treatment. Thrombocyte counts are therefore recommended as a guide to the efficacy of treatment. The author also considers the sedimentation rate of red corpuscles to be of diagnostic value. It rises as the disease progresses but falls rapidly during treatment, reaching the lowest level when parasites disappear from the circulation. Unless the sedimentation rate falls to the normal level malaria is not regarded as cured. The rate was found to be highest in benign tertian, lowest in subtertian and intermediate in quartan. The last part of the paper is devoted to metabolism in malaria.

C. A. HORS.

LOPATIN (G M) [Congenital Malaria.]—*Trans Kuzbyshev Mili Med. Acad. Red Army* 1940 Vol. 4 pp 215-221 [In Russian.]

The author first briefly reviews the case for congenital malaria. With regard to the mechanism of infection, transplacental transmission is considered to be the only possible method. This may be (1) intra-uterine, produced by the emigration of infected maternal erythrocytes into the foetus as the result of damage to the placental vessels caused by malaria, or (2) at the time of parturition, during the detachment of the placenta, which may be accompanied by rupture of some of the villi and lead to the mixing of the maternal and foetal bloods.

After describing the influence of malaria upon the pregnant mother and foetus, the author passes to a review of 35 cases of congenital malaria observed in Kuzbyshev. In determining the antenatal nature of the infection in infants the following criteria were used: (1) presence of malaria attacks in the mother during pregnancy or immediately before or after parturition; (2) manifestation of malaria in the infant within an interval not exceeding the incubation period (about a fortnight); (3) appearance of first symptoms of malaria between November 1st and April 1st, i.e. during the season of inactivity of mosquitoes; and (4) finding of the same species of *Plasmodium* in mother and infant.

With respect to type of malaria the cases were distributed as follows 15 benign tertian, 10 subtertian 8 quartan. In 27 cases the weight of the new born infants was under 3 000 gm 15 being below the lower limit for full-term infants (2,500 gm.) Chronic disturbances of nutrition appear to be a common feature in congenital malaria. The fever was erratic in 24 cases the attacks were quotidian or on alternate days in eight cases and absent altogether in three Spleen enlargement was more marked than in acquired malaria The complexion of infants suffering from congenital malaria is characteristic and may serve as an early diagnostic character The skin is usually very pale waxy or earthy sometimes even jaundiced. The haemoglobin content falls to 20 per cent red blood cells to 1 million there is leucopenia and other blood changes found in malaria are present In congenital malaria the jaundiced complexion and blood changes are more persistent under treatment than in acquired malaria The pathologico-anatomical changes are identical with those in chronic malaria, with large accumulations of pigment in the spleen liver and other organs.

Congenital malaria is usually refractory to treatment with quinine and acrinine [atebrin] and it may leave a lasting effect in the subsequent life of the child in the form of infantilism and low resistance against infections and environmental influences C A Hoare

SABLIN (P E.) & EGOROVA (O G) [Peculiarities in the Course of Lobar Pneumonia in Malarial Patients.]—*Trans Kuzbyshev Milit Med Acad Red Army* 1941 Vol 5 pp 23-27 [In Russian.]

A comparison of cases of lobar pneumonia with those in which this disease was combined with malaria has demonstrated the following facts (1) Malaria affects the reactive faculty of the organism thereby influencing the course and issue of lobar pneumonia (2) the clinical course of this disease in malarial patients is characterized by the frequent absence of leucocytosis and by a retardation of the resolution of the process resulting in prolongation of the fever period and in belated disappearance of the signs in the lungs detectable by percussion and auscultation (3) the reduced reactivity of the organism in malarial subjects may lead to complications in lobar pneumonia (carnification of the lung suppurative processes etc.) C A Hoare

ORLINA (M M.) [Functional Changes of the Liver in Malaria.]—*Trans Kuzbyshev Milit. Med Acad Red Army* 1941 Vol 5 pp 29-34 [In Russian.]

The author describes changes in the function of the liver observed in malaria. She notes that enlargement of this organ is just as frequent as enlargement of the spleen (41 in 47 cases) The functional state was studied by determining the bilirubin and carbohydrate metabolism and the condition of the active mesenchyme Bilirubinuria and bilirubin aemia were found respectively in 22 and 18 per cent of subtertian cases in 33 and 61 per cent. of benign tertian, and in one out of three cases of quartan. Urobilinuria, reflecting hepatic insufficiency occurred in 25 per cent. of subtertian cases 60 per cent of benign tertian and in two out of three cases of quartan The condition of the active mesenchyme was determined by the rate of excretion of methylene blue (introduced intra muscularly) by cells of the reticulo-endothelial system. An increased rate was found in 12 out of 14 cases. As regards the carbohydrate

metabolism, it was slightly disturbed in the acute cases, in 50 per cent. of subtertian and quartan, and in 60 per cent. of benign tertian, while simultaneous disturbances in all the hepatic functions in question were observed in 25 per cent. of cases. Finally it is noted that in the Kufbyashev district malarial cirrhosis of the liver is a common occurrence

C A Hoare

BYSTRITSKI (I A) (Nephropathies in Malarial Children.)—*Trans. Kufbyashev Milit Med Acad Red Army* 1941 Vol. 5. pp. 35-39 [In Russian]

In Kufbyashev the author observed nephropathies in 55 out of 300 (18.3 per cent) cases of malaria in children dealt with in 1938 and 1939. The frequency of kidney disorders was greatest in subtertian, after which came quartan and benign tertian malaria. The majority (35) were cases of pyelitis, while nephroso-nephritis was observed in 18 patients, and pure nephrosis in two. Most of the cases of nephropathy (34) were mild and responded readily to specific quinine therapy good hygiene and dietetic treatment. In some cases however there occurred medium (12) and severe (5) forms of malarial nephropathy producing persistent changes in the renal tubules, or eclamptic, pseudo-traumatic symptoms.

C A Hoare

DE NEGRI (Ugo) Frequenza e interpretazione diagnostica delle granulazioni basofile degli eritrociti nel sangue di malarici privo di parassiti (Frequency and Diagnostic Significance of Basophilic Granulations of Red Cells of Blood of Malaria Patients from which Parasites are Absent.)—*Riv di Malarologia* Sez. I. 1941 Sept-Oct Vol 20 No 5 pp 309-316 With 1 fig [15 refs.] French summary (7 lines)

The author has noted the frequency with which basophilic granulation of parasite-free red cells is seen in the blood of malaria patients both in the presence and absence of such parasites in the peripheral blood. For staining blood films the method of May-Grünwald-Giemsa is used. Notes on the results of examination of 1400 blood films are given. In 222, basophilic granulation was seen but no malaria parasites were found. In 55 ring forms of *P. falciparum* were found with basophilic granulation of non-parasitized red cells. In 30 crescents were found with annular granulation of parasite-free cells. Similar findings were reported in 12 films containing young forms of *P. vivax* and in five containing *P. vivax* gametocytes. These granular cells are commonly normal in size the number of granules is 10 to 20 and one such granular cell may be found in from 15 to 20 microscope fields.

To 78 of the 222 patients, parasite-free but with basophilic granulation, adrenalin was given to provoke splenic contraction. During the ensuing febrile attacks *P. falciparum* was found in the blood of 38, *P. vivax* in the blood of 15. In 25 there was no thermal or parasitic response to the adrenalin.

The author concludes that such basophilic granulation is of very considerable diagnostic significance if parasites cannot be found. Its presence indicates in his experience that there is a 70 per cent. probability of a *P. falciparum* infection.

Norman White

VINCI (Achille) *Sindrome addominale acuta da malaria. [Acute Abdominal Syndrome in Malaria.]—Riv di Malarologia* Sez. I 1941 Sept.-Oct. Vol. 20 No 5 pp 341-348. [16 refs.] French summary (4 lines)

This is a description of a patient admitted to hospital with nearly all the signs and symptoms of an acute abdominal lesion intense pain distension generalized tenderness, bilious vomiting constipation rapid pulse and respiration. The pulse was not however the small thready pulse of a generalized peritonitis. There was after a period of acute distress a certain rhythm in the severity of the symptoms synchronous with febrile manifestations which indicated the possibility of a malaria infection. An injection of adrenalin caused the appearance of *P falciparum* in the peripheral blood. Quinine effected a cure. The paper contains numerous references to comparable cases in the literature

Norman White

VINCI (Achille) *Eruzione esantematica di origine malarica. [Exanthematic Eruption of Malarial Origin.]—Riv di Malarologia* Sez. I 1941 Sept.-Oct. Vol. 20 No 5 pp 349-352 [11 refs.] French summary (3 lines)

The description of a patient with a diffuse rash covering the abdomen and back and to a less degree the thorax. The face hands and feet were free. The rash consisted of oval rose-coloured spots the size of a bean it was not confluent and but little irritable. An intravenous injection of 1/20 mgm of adrenalin was followed by the appearance of *P falciparum* in the peripheral blood. The patient had received no anti-malarial treatment before the appearance of the rash. The author regards the rash as an indication of sensitivity to toxins elaborated by the malaria parasites

Norman White

FRICKS (L. D.) *Emergency Measure and Foresight in Malaria Control. —Milit Surgeon* 1941 Aug Vol. 89 pp 182-188. [Summary taken from *Public Health Engineering Abstr* Washington. 1941 Dec Vol. 21 No 12 p 15 Signed Harold F Rock.]

The word foresight in the title is particularly applicable to this paper because it was originally published in the August 1920 edition of *The Military Surgeon*. The conditions prophesied have come into being in the present emergency.

The article indicates that the routine measures against malarial mosquitoes be employed but with the use of construction camps and rapidly built camps it is often some time before the usual measures can become effective. It is emphasized that in selecting a camp site bodies of water that are apparently nonpotential sources of *Anopheles* production should be carefully examined to see if seasonal floatage or aquatic vegetation may cause potential mosquito breeding places at certain periods.

Mosquito nets are markedly ineffective. Salves and lotions are effective only for comparatively short periods. A study of life habits of *Anopheles* shows that their habits may be used to advantage in their destruction.

(1) After becoming engorged, they rest on the wall or other shaded resting places relatively close to where they obtained their blood meal.

(2) Those who have digested their meal are most apt to depart from the enclosure or house either just after dusk or soon after daylight.

(3) In a screened building those ready to depart collect on the door or window screens where they may easily be destroyed.

(4) Recently engorged mosquitoes at rest are easily destroyed with an ordinary fly swatter.

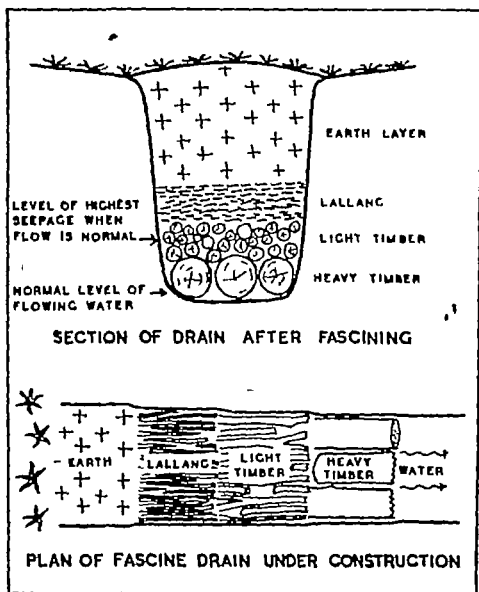
(5) Light-coloured walls make their destruction an easier task. On dark surfaces or in relatively dark rooms, a flash lamp is an advantage.

Gorgas made practical application of this method at the Panama Canal construction with excellent results. In two camps 200 yards apart, near a swamp one employed this method, and the other did not. The malaria rate was 42 times higher in the camp not employing this control measure.

The fact that the destruction of engorged mosquitoes is successful as a control measure depends on the fact that at its first bite the mosquito never carries but receives infection and it is only after the lapse of a week or more that it becomes capable of infecting a human host at a subsequent bite. Hand catching or destruction of engorged mosquitoes is simple and has been proven to be effective if efficiently carried out.

TWEEDIE (D Reid) REID (J A.) & HODGKIN (E P) *Fascine Drainage*. Prepared for the Malaria Advisory Board, F.M.S. Kuala Lumpur 14 mimeographed pp. With 2 figs. [1941]

This pamphlet explains the technique of fascine drainage. The method described has given satisfactory results in small watercourses which are the most important breeding places of *A. maculipes*. The drain is first cleaned thoroughly by removing vegetation and all obstructions. Packing starts at the head of the drain. The size of the wood will depend on what is available and on the size of the drain: the bigger the drain the bigger the timber. For large watercourses whole tree-trunks can form the bottom layer. The details of construction are well shown in the illustration. The logs should overlap one another slightly. Instead of lalling palm fronds, shrubbery or thick grass may be used. The packing is protected with a covering of earth usually obtained by cutting from the sides of the drain: this should not be less than one foot thick. In very deep drains it may not be necessary to fill to ground level. Vegetation must be encouraged to grow over the drain with all speed. It is important to complete one portion of the drain at a time otherwise it may become choked before completion. Tributaries must be fascined before the main channel and should enter the main drain pointing downstream. Sharp bends should be avoided. The amount of timber used will depend on the volume of water to be drained: the amount should be increased gradually from source to outlet. It is important to protect newly fascined drains from damage by storm water. In swampy soil newly cut drains should be left open for a month before fascining and so acquire a normal level of water. If water entering a fascined drain contains much salt it can be passed through a stone-packed filter. Sullage should be similarly treated if it be taken into a fascined drain.



Norman White

EJERCITO (Antonio) Atabrine in Malaria Prophylaxis.—*Riv di Malariaologia* Sez. I 1941 Sept-Oct Vol. 20 No 5 pp 317-328

The author reports the results of an attempt to determine the value of atabrine as a prophylactic of malaria. A labour force working on the Manila Ipo aqueduct in the Philippines in an endemic malaria area in which no attempt was made at *Anopheles* control was the subject of experiment. The labour force was imported and some members of it stayed for very short periods. A preliminary spleen and blood survey determined those who had no evidence of malaria infection and no history of previous malaria attacks. Of these 212 were given atabrine 0.20 gm. twice a week. 272 received no prophylactic treatment. Otherwise the conditions of the two groups were comparable. The observations were continued for about 11 months. Of the 212 members of the atabrine group only 78 stuck to the place from the

minimum of eight days to the maximum 300 days (averaging 41 days). Of these 10 contracted malaria 13 per cent. Of the control group 106 remained for periods of from 8 to 150 days (average 23 days) of these 38 acquired malaria infection 36 per cent. A protocol contains details of each individual.

Norman H. Hirst

DIKSHIT (B. B.) Malaria Immunity in the Rhesus Monkey.—*Jl Malaria Inst. of India* 1941 Dec Vol. 4 No 2 pp 199-206.

The elaboration of a method of transferring the blood of one monkey to another has enabled the authors to study the effect of transference of blood of monkeys immune to *Plasmodium knowlesi* infection to non-immune monkeys. When about 80 per cent. of immune blood was withdrawn from an immune monkey and was replaced by non immune blood the monkey did not lose any of its immunity to superinfection. If over 70 per cent. of the blood of a normal monkey was withdrawn and replaced by immune blood the monkey acquired an immunity. If this last experiment were performed with an infected instead of a normal monkey the infected monkey was cleared of most of its infection the animal passing into a state of chronic infection. The results of these experiments are discussed from the point of view of the mechanism of immunity in malaria and it is concluded that the cellular and humoral factors are working together in close co-operation, the humoral agencies probably acting by stimulating the cells and not directly on the malarial parasites.

C. M. Wenyon

SEKTHARAMA IYER (P. V.) SHORTT (H. E.) & MENON (K. P.) The Stage of *Plasmodium gallinaceum* found in the Incubation Period—Second Observation.—*Jl Malaria Inst. of India*, 1941 Dec. Vol. 4 No 2 pp. 179-180.

By the examination of the brain of fowls inoculated with sporozoites of *Plasmodium gallinaceum* from *Aedes aegypti* at varying intervals it has been demonstrated that typical exoerythrocytic forms can be found as early as the fifth day. These are few in number and require prolonged search for their discovery. It is concluded that these are the forms developed from sporozoites and that they give rise later to the erythrocytic pigmented forms. The authors say that it is probable that a longer search will reveal the exoerythrocytic schizonts earlier even than the fifth day.

C. M. Wenyon

ADLER (S.) & TCHERNOMORITZ (I.) Continued Passage of Extra-Erythrocytic Forms of *Plasmodium gallinaceum* in the Absence of Erythrocytic Schizogony.—*Ann Trop Med & Parasit.* 1941 Dec 31 Vol 35 No 2 pp. 241-246.

The authors have shown that administration of quinine hydrochloride in daily doses of 150 mgm. per kilo of body weight will eliminate the pigmented erythrocytic forms of *P. gallinaceum* from the blood of fowls while leaving the exoerythrocytic schizonts intact. If brain emulsion of such a treated fowl containing exoerythrocytic schizonts is inoculated to a clean fowl which shortly after is placed on the above daily dosage of quinine the development of exoerythrocytic schizonts takes place. Some of the merozoites produced by these schizonts enter the erythrocytes but they do not develop as far as the pigmented stage.

before they are eliminated by the quinine. Such a fowl examined post mortem is found to have many erythrocytic schizonts in the brain but no malarial pigment in the organs. Five passages of the kind have been made showing that exoerythrocytic development may occur in a number of passages without the development of any pigmented stages. In one fowl so treated cessation of quinine for one day was sufficient to allow the non-pigmented erythrocytic forms to reach the pigmented stage

C M Wenyon

LAIRD (Raymond L.) Observations on Mosquito Transmission of *Plasmodium lophurae*.—*Amer J Hyg* 1941 Nov Vol. 34 No 3 Sect. C pp 163-167

BLACKWATER FEVER.

YULE (Charles L.) Hemoglobinuria.—*Physiol Rev* 1942 Jan. Vol 22, No 1 pp 19-31 With 1 fig [47 refs.]

This review which is a critical survey of the experimental findings relating to haemoglobinuria is an attempt to reach a clearer understanding of the factors underlying the elimination of haemoglobin by the kidney

The finding of granules of haemoglobin or its iron-containing breakdown products in the epithelium of the convoluted tubules following the injection of haemoglobin indicates that this portion of the kidney plays some part in the process of haemoglobin elimination and for years a controversy has existed whether the tubular activity is one of excretion or reabsorption. A review of experimental work affords no positive evidence of tubular excretion and it would appear that in most instances an interpretation of the findings in favour of reabsorption could equally well be made. Evidence derived from the study of lower vertebrates also supports this view. Much of the early confusion was doubtless due to the fact that haemoglobin is readily observed in the capsules at the height of haemoglobinuria but is not demonstrable at later stages owing to the increased dilution. Furthermore haemoglobinuria occurs in dogs in the presence of severe tubular damage caused by mercury poisoning and in human beings the rate of excretion has been found to be markedly elevated in cases of known glomerular damage

Although it is now generally agreed that haemoglobin escapes through the glomerulus there is little agreement regarding the way in which it does so. Because serum albumen the molecular weight of which is approximately the same as that of haemoglobin (68,800) does not normally appear in the urine it has been suggested that haemoglobin escapes through the glomerulus only as the result of an induced transient injury. Careful evaluation of all the evidence available indicates however that glomerular injury is not the fundamental mechanism of haemoglobin excretion and numerous studies have shown that intra venous injection of stroma free haemoglobin solution has practically no pharmacological activity and produces no evidence of glomerular damage

daily injections sufficient to cause gross haemoglobinuria. Since after lowering the threshold to various levels the excretion rate curves are parallel to those obtained initially, and since under these conditions the estimated tubular reabsorption rate is lowered proportionally it is not unreasonable to suppose that a complete cessation of tubular reabsorption would entirely eliminate the threshold. The constant level attained with diminishing daily doses in the earlier experiments suggests a state of equilibrium between the amount of haemoglobin reabsorbed by and the amount of haemoglobin products removed from the tubular epithelium daily rather than a complete cessation of reabsorption. If modification of tubular reabsorption accounts for the lower threshold, the amount removed daily must be quite significant because when the injections of haemoglobin are discontinued it returns to its initial level within a period of several weeks. Such a mechanism would also explain the absence of iron-staining pigment in the kidney after repeated sub-threshold injections because the amount picked up would be less than the rate of daily removal from the tubular epithelium.

The accompanying figure illustrates the type of graphical analysis of experimental data by which quantitative estimates of the glomerular filtration and tubular reabsorption rates of haemoglobin have been made. An average value for the initial rate of tubular reabsorption lies between 2.0 and 3.0 mgm. per minute and values of less than 1.0 mgm. per minute have been obtained after lowering the threshold by about 70 per cent.

BOGNIARD and WHIFFLE (1932) have shown that at least some of the iron-containing portions of haemoglobin are stored in the tubular epithelium and more recently iron retention by the kidneys has been determined after the injection of haemoglobin containing radioactive iron. Single large injections were given to normal dogs and also to those in which the threshold had been markedly lowered by repeated injections. Tubular reabsorption values were estimated from the rate of pick up obtained by the graphical analysis just described, and the time required for the disappearance of haemoglobinaemia. The animals were subjected to viviperfusion 24 hours later and comparisons were made between the estimates and the actual amounts of radioactive iron found in the kidneys. Calculated values ranged from somewhat over 40 per cent of the injected amount in the normal group to about 20 per cent in the group with the lowered thresholds. However only about 16 per cent of the injected iron was present in the kidneys of the normal animals contrasted with over 20 per cent. in the kidneys of comparable animals with lowered thresholds. It must be assumed that in normal animals there is a very rapid removal of haemoglobin after it is picked up by the renal epithelium and it must also be assumed that both the intake and output of haemoglobin by these cells are greatly diminished after repeated daily injections. If the low radioactive iron content of the kidneys in the normal animals represents the total amount reabsorbed during the period of haemoglobin aemia it seems necessary to assume that the glomerulus is responsible at least in part for the threshold phenomenon and that it is the permeability of this structure rather than the reabsorption by the tubular epithelium which is modified by repeated injections. However the author reaches the conclusion that much of the evidence available at the present time favours the theory that tubular reabsorption alone is responsible for the threshold phenomenon, and final proof must await the outcome of further investigations.

Comparisons of the renal threshold level for haemoglobin in man and various animals are often difficult to make. Recent estimations suggest that the threshold level in dogs lies between 80 and 150 mgm. of haemoglobin per 100 cc. of plasma, and for man at about 135 mgm per 100 cc.

The author next passes to a discussion regarding the manner in which haemoglobin is picked up and stored by the epithelium of the convoluted tubules. He concludes by pointing out that the foregoing concepts of renal haemoglobin examination are largely based on quantitative studies in which the urine was rendered and kept alkaline. The paper ends with a brief discussion of the effect of the reaction of the urine.

W. Yorks

FAHR (Th.) Die Speicherungsnephrosen. [Storage Nephroses].—*Klin. Woch.* 1941 Aug 30. Vol. 20 No 35. pp 873-875

The author defines the group of nephroses which he designates as storage nephroses (Speicherungsnephrosen) as those which exhibit a histological, but no further demonstrable sign of substances which are excreted by the kidneys. Such substances may be fat carbohydrates uric acid, etc., when they are present in abnormal quantities in the blood, they may be various proteins, bile etc. which are excreted because they are foreign to the blood, or they may be substances foreign to the body such as dyes and drugs.

After considering the nephroses due to the excretion of fat carbohydrates and uric acid, the author passes to the second group in which he refers to the excretion of Bence-Jones protein cholemic nephroses and the storage of haemoglobin in haemoglobinæmic nephroses. This is seen in very varied conditions such as burns, frost bite blackwater fever gas gangrene particularly in pregnancy and in arsenuretted hydrogen poisoning.

Macroscopically the kidneys are of a dirty brown sepia colour but microscopically the localization of the haemoglobin varied greatly in different cases. Sometimes it is present in large amounts in the capsules and tubules but is completely absent from the epithelial lining of the tubules. In other cases there is an enormous diffuse storage of haemoglobin in the epithelium, together with some in the lumen of the tubules, but none in the Bowman's capsules. From the standpoint of the filtration-absorption theory these varied appearances can be explained as different phases of the excretion process, the former representing the filtration phase and the latter the re-absorption phase.

This explanation, however cannot be entirely adequate as in man one sometimes comes across cases in which notwithstanding day-long haemoglobinuria, there is no storage of haemoglobin in the epithelium, whilst in other cases evidence of storage in the epithelium appears almost immediately. A case reported by Vornann is quoted in which after a burn, haemoglobinuria developed immediately the patient died four hours later and sections of the kidneys showed distinct haemoglobin storage in the epithelium.

Fahr concludes that these different localizations of the haemoglobin are not the expression of two excretion phases but are the result of two different methods of excretion, depending on the concentration of the excreted material. The glomerulus and the tubules form a functional unit in which a division of work has occurred. In the glomerulus very diluted solutions are filtered, whilst in the tubules elimination takes place in concentrated form.

W. Yorks

RIMINGTON (Claude) Haemoglobinometry—*Brit. Med. J.* 1942
Feb 7 pp 177-178

There is a need for a rapid method for the determination of total blood pigment in samples of whole blood. The determination should include not only oxyhaemoglobin and reduced haemoglobin but also the abnormal pigments methaemoglobin and sulphaemoglobin some times met with after the administration of sulphonamides and CO-haemoglobin. The author has recently been using a method of total blood-pigment determination in which all the haem pigments are converted into pyridine-haemochromogen and the intensity of absorption of the latter around 550 m μ is measured upon the Hilger Nutting photometer. The results possess a high degree of accuracy and have the added advantage that they may be referred to a pure crystalline chemical substance—haemin—by means of which the instrument is calibrated. The method is based upon the procedure described by ROETS (1940) in South Africa.

Rimington classifies the various methods available for the determination of haemoglobin and comments briefly upon them drawing attention to their disadvantages and then gives the description of his own method which is reproduced here

A 1 in 500 dilution of blood in decinormal sodium hydroxide is made using a standard or calibrated pipette. This dilution may of course be made in two steps if it is preferred, as in the worked example quoted below. After a few minutes at room temperature a convenient volume of pyridine is added. Upon mixing by gentle rotation the conversion of the haem pigments into the alkaline parahaematin is completed within a few seconds hence there is no necessity to allow the original blood dilution to stand for 10, 20 or even 40 minutes before proceeding, or alternatively to heat in a boiling water bath as is required when the alkaline-haematin method is used.

A pinch of good-quality sodium hydrosulphite ($\text{Na}_2\text{S}_2\text{O}_4$) is now added to the mixture and the contents of the flask are swirled gently until the solid has dissolved. The immediate colour change to pink denotes the conversion of the pigments into pyridine-haemochromogen. Without undue delay (to guard against reoxidation) the solution is transferred to a photo-electric colorimeter cell and the light absorption in the region 550 to 555 m μ is measured using a suitable filter (e.g. Ilford spectrum filter No. 605—yellow-green). From the calibration factor obtained by using known weights of pure haemin instead of blood and proceeding as above the haemoglobin content of the blood is then calculated.

Molecular weight of haemin, $\text{C}_{21}\text{H}_{27}\text{O}_5\text{N}_4\text{FeCl}$ = 651.4
Iron content of haemoglobin = 0.334%

Molecular weight of haemoglobin = 66,890
Haemoglobin = 66,890

Haemin = 651.4
4 × 651.4 = 25.66

Should it be contended that the error involved in calculating the molecular weight of haemoglobin from its iron content is unduly large the results might alternatively be expressed in terms of haemin or haematin. The extinction ϵ of pyridine-haemochromogen prepared from crystalline haemin and using a photo-electric absorptiometer with Ilford No. 605 filter and 1-cm. cell was found to be 0.103 at a concentration of 1 mg per 100 c.cm.

Should no photo-electric colorimeter be available the concentration of the pyridine-haemochromogen solution may be determined by one of the alternative methods, such as colour comparison in a colorimeter with standard prepared from haemin (standard solutions of haemin in alkali

should be kept in the dark) or dilution while viewing with a hand spectroscope until the intensity of the absorption band matches that of a standard, as described by Roets (1940). This last method is certainly the most simple and rapid, although not quite so accurate as the use of a colorimeter. Pure haemin is easily prepared according to Gattermann (1937) but should be recrystallized as follows:

"5 grammes of haemin is dissolved in 15 c cm. of pyridine, and 40 c cm. of chloroform is added. The solution is passed through a No. 3 or No. 4 sintered-glass filter to remove any protein and is run into a mixture of 250 c cm. acetic acid + 5 c cm. saturated $\text{NaCl} + 4$ c cm. concentrated HCl , which is maintained at water-bath temperature. After cooling to room temperature the crystals are filtered and washed successively with 50 per cent. acetic acid, water, alcohol, and ether and then dried.

"I have used the pyridine-haemochromogen method with equal success for specimens of plasma and urine containing haemoglobin, myohaemoglobin, or mixtures of these with their derivatives. It is only necessary to adjust the initial dilution so that the concentration of pigment in the final solution falls within the comfortable range for measurement.

Example—1 c cm. of blood was diluted to 100 c cm. with decinormal sodium hydroxide. To 1 c cm. of this solution was added 3 c cm. of the alkali, then 1 c cm. of pyridine and, after mixing, a pinch of sodium hydrosulphite. In a 1-cm. cell the reading on the Huger-utting photometer at 55 μ was 0.573. The calibration for this instrument had been found to be 0.62. Hence

$$\text{Hb per c cm. of blood} = 0.573 \times 0.62 \times 500 = 177.6 \text{ mg. per c cm.}$$

$$\text{or } 17.76\%$$

"The same result was obtained whether the determination was completed within five minutes or after allowing the mixture with alkali to stand for one hour and that with pyridine for a further half an hour."

W. Yorke

PRICE (C H G.) Blackwater Fever—Jl Roy Army Med Corps.
1942 Apr Vol 78 No 4 pp. 198-199.

In September 1940 five French soldiers from French Equatorial Africa were landed from a ship that had been bombed and sunk. All suffered from the effects of immersion and exposure and four developed symptoms suggestive of malaria. In three of them *P. falciparum* was found in the blood and the patients recovered after appropriate treatment. The fourth patient on September 20th developed pyrexia with rigors and anuria, and blood examination revealed the presence of *P. falciparum*. The blood count showed the red cells to be 2,500,000 per cmm and the haemoglobin 70 per cent. The patient became rapidly jaundiced and the following day his blood count had fallen to 2,050,000 per cmm. A blood transfusion was given without any clinical reaction. On September 23rd the red cell count was 1,600,000 per cmm but no parasites were found. The small quantity of urine passed on that day contained acid haematin in large amounts. Alkalies have been given and these resulted in the change of the reaction of the urine to alkaline. The blood urea was found to be 400 mgm. per 100 c. There was terminal suppression of urine and death occurred September 24th.

A post-mortem examination was performed and the findings given in some detail. There was nothing unusual in these findings and the conclusion is reached that the distension of the proximal portions of the nephron was due to blockage of the collecting tubules and papillary ducts.

W. Yorke

BHATTACHARJEE (Jagadish C.) Blackwater Fever in Darjeeling et al.—
Indian Med Gaz 1941 Dec Vol. 76 No 12. pp 734-737

During the five years 1935 to 1939 20 cases of blackwater fever have come under the author's observation in Sihguri a town situated about 300 feet above sea level in the Darjeeling district of Bengal. The locality is hyperendemic for malaria, the spleen index amongst children under 12 years of age varying between 60 and 70 per cent. The climate is hot and moist in summer and cold and dry in winter. The rainfall between June and October is heavy.

Tables show the incidence of cases month by month and also the age incidence. The author deals with such matters as the relation of the onset of blackwater to quinine, the history of previous attacks, clinical manifestations, and the result of examination of the blood for malaria parasites. Details are also given regarding the treatment administered. The paper contains nothing new. *W Yorks*

MASSIAS (Charles) L'hémogloburie palustre (Etude biologique)
 [Blackwater Fever]—*Rev Méd Française d'Extrême-Orient*
 1941 Mar-Apr Nos 3-4 pp 175-184

Two cases of blackwater fever encountered by the author are described in great detail. This is followed by generalizations on the pathology and treatment of the disease. The paper contains nothing new and requires no special notice here. *W Yorks*

BOYLE (A. Kerr) Blackwater Fever and Blood Transfusion—*Jl Roy Army Med Corps* 1942 Jan Vol. 78. No 1 pp 44-45

The author states that blood transfusion is not indicated in every case of blackwater fever, but its value is very great in the early stages of toxic polyuric and relapsing cases. Small transfusions of 300 to 450 cc should be given and repeated as often as required. Citrated blood is better than whole blood, especially in the polyuric type in which the alkali reserve is often lowered. It is not possible in West Africa at the present time to found and maintain a blood depot; the blood must be given as soon as it is withdrawn. The only practicable scheme is to have a list of voluntary grouped donors, but routine grouping is not enough; there must be direct test of the compatibility of the bloods of donor and recipient, and the blood of the donor must be free from parasites and its cells not abnormally fragile. [It is not easy to see how freedom from malaria parasites can be ensured. Direct blood film examination may not be enough.] The author makes use of a 12 oz. medical flat bottle in which is put 30 cc of 3.8 per cent sodium citrate. The bottle will hold 300 cc. of citrated blood, and is partly immersed in a hot water bath during the process of direct transfusion. *C W*

ROY (B. C.) Vitex Therapy in Blackwater Fever—*Jl Indian Med Assoc* 1941 Sept Vol 10 No 12. pp 475-482. With 2 charts. [23 refs.]

After giving a lengthy summary of blackwater fever, which contains nothing new, the author passes to the treatment of the disease with

Vitex pedunculata (this Bulletin 1921 Vol. 17 p 306 1924 Vol. 21 p 604 1940 Vol. 37 p 837). Instructions are given regarding the method of preparation and the dosage but no satisfactory evidence is produced that *Vitex* therapy is of the slightest use in blackwater fever

W York.

TRYPANOSOMIASIS.

NASH (T A M) A Study of the Causes leading to the Seasonal Evacuation of a Tsetse Breeding-Ground.—*Bull Entom. Res* 1942 Jan Vol 32 Pt 4 pp 327-340 With 3 figs. on 1 plate.

The author has shown previously that in Northern Nigeria *Glossina morsitans* and *G. tachinoides* annually shift their breeding-ground in March from the edge of a residual forest island to the centre—a distance of some 40 yards. This move is associated with an increase in mortality among the last puparia to be found. His object in this investigation was to discover what prompts the female to move just before pupal mortality increases. The movement is attributed to the negative reaction to light developed by the tsetse fly when exposed to an unduly high temperature [see this Bulletin 1939 Vol 35 p. 338]. The period of migration coincides with an abrupt increase in the number of hours with a shade temperature above 90 F (32°C.) the temperature at which the negative reaction to light begins. Hungry flies may overcome this avoidance of the light and feed at the forest edge but the females in late pregnancy which do not feed, remain in the forest centre where they are not exposed to so high a rate of evaporation. Detailed meteorological data given in this paper define the environments of adults and pupae in a locality very close to the hot dry limits of the range of these two species.

J B Wigglesworth.

SANDERS (G F T) Preliminary Report on the Treatment of Sleeping Sickness by 4,4-Diamidino Diphenoxy Pentane.—*Ann Trop Med & Parasit* 1941 Dec. 31 Vol. 35 No. 2 pp. 169-174.

Details are given of 14 cases of sleeping sickness in the Gold Coast which were treated by 4,4-diamidino diphenoxy pentane. The author summarizes his results as follows —

"1. Details are given of fourteen cases of sleeping sickness treated with 4,4-diamidino diphenoxy pentane. In all cases the peripheral blood was sterilized by four injections of the drug.

"2. Seven out of ten central nervous system cases were possibly cured. Of these, one (case 3/II) was very advanced.

"3. Up to 65 injections were given without ill result. All cases who were apparently cured, except case 3/II, were symptomless after at most, 20 injections.

"4. Early cases appear to be cured.

"5. Untoward results are trivial."

W York.

DAUBNEY (R.) & HUDSON (J. R.) The Action of Two Aromatic Diamidines on *Trypanosoma congolense* Infections in Cattle, with a Note on Delayed Poisoning by 4,4'-Diamidino Diphenoxy Pentane.—*Ann Trop Med & Parasit* 1941 Dec. 31 Vol. 35 No. 2. pp 175-186

This paper gives information regarding the experimental treatment of cattle infected with *T. congolense* by 4,4'-diamidino stilbene (stilbamidine) and 4,4'-diamidino diphenoxy pentane (pentamidine). Cattle were inoculated with a local strain of the parasite which is maintained in rabbits. The strain is of relatively high virulence and kills young cattle in from three to five weeks.

An attempt was first made to obtain some idea of the maximum tolerated dose and its therapeutic effect and consequently doses of 20 and 15 mgm per kilo were administered. In later experiments the effect of two or three smaller doses was ascertained. It was found that neither drug produced a complete cure. In doses of 10 mgm per kilo upwards pentamidine produced immediate poisoning. Delayed poisoning occurred with single doses of from 5 to 15 mgm. per kilo and with repeated doses of from 5 mgm per kilo upwards. Cattle can be brought to the premunized state with either compound. The authors describe in some detail the delayed toxic effects of pentamidine as seen by them in two healthy calves which were treated with three inoculations of 5 mgm. per kilo at 7-day intervals.

The animals remained in normal health for 24 days after the first infection. On the 25th day both animals showed symptoms, the respirations being more rapid than usual and in one of them the urine was noticeably yellow. On the 28th day one of the animals was down and semi-comatose and had to be killed. The other animal was lying down most of the 29th and 30th days and took very little food when made to rise he was unsteady on his legs. During the next six days he made a gradual recovery and at the time of writing four months later he appeared to be quite healthy but his growth had undoubtedly been stunted.

Post-mortem examination of the animal which died revealed oedema of the gastric mucous membrane with opaque plaques 2 to 3 mm. in diameter and scattered haemorrhages. The liver was swollen, pale and mottled with putty-coloured spots. The kidneys were darker than normal, and there was a slight pinkish staining of the visceral fat. Histologically the most important change was an extremely advanced fatty degeneration of the liver. W. Yorke

FULTON (J. D.) & YORKE (Warrington) Studies in Chemotherapy XXVII.—Further Observations on the Stability of Drug-Resistance in Trypanosomes.—*Ann Trop Med. & Parasit* 1941 Dec. 31 Vol. 35 No. 2. pp 221-227

In this paper the history of strains of *T. rhodesiense* made resistant to a considerable number of chemotherapeutic substances since 1929 is brought up-to-date. The authors summarize their work as follows—

1. The atoxyl fast strain has preserved its character unchanged for 12½ years during which it has been passaged by blood inoculation through a series of over 1,500 mice.

2. Three Bayer fast strains were prepared and maintained by mouse passage. The first lost some of its resistance during the first year and all trace of resistance within four years. The second lost some of its resistance

during the first year but retained a considerable degree of resistance after four years the third strain, which was prepared by enhancing the resistance of the second strain by further long continued exposure to the drug, maintained its resistance unimpaired during a period of three and a quarter years.

"3 Two undecane diamidine-fast strains were prepared, one in mice and the other in rabbits. Both these strains had lost some of their resistance within a year and all trace of resistance within three and a half years.

"4 The synthalin-fast strain behaved exactly as the undecane diamidine-fast strains."

W. Yorke.

SAUNDERS (G) After History of Trypanosomiasis Cases treated by Bayer 205.—*Jl Trop Med & Hyg* 1942, Feb 16, Vol 45 No 4 pp. 25-26.

"(1) Of thirty-six cases of Trypanosomiasis (*pawbiense*) followed up for thirteen years or more, thirty-four of the thirty-five who had definite nervous involvement have died of sleeping sickness, and the one survivor has relapsed.

"(2) An early case followed up for thirteen years is apparently cured.

"(3) Even in advanced cases, Bayer 205 may produce remission of many years."

[See this *Bulletin* 1928, Vol 25 p 785 1929 Vol 26 p 708]

HAWKING (Frank) The Biological Standardisation of Suramin (Antrypol, Bayer 205).—*Quarterly Jl Pharm. & Pharmacol* 1941 Oct.-Dec. Vol 14 No 4 pp 337-346.

This paper is of a rather technical nature and must be consulted in the original by those interested. The following is the summary —

"1 Methods are described for the biological standardisation of the toxicity and therapeutic potency of suramin (antrypol, Bayer 205)

"2 When the toxicity of suramin was tested by injecting it intravenously into mice, the LD50 was found to be 0.63 (0.61-0.65) mgm. per gm., and the slope of the log-dose probit-response curve was 9.9 ± 0.8 .

"3 When the therapeutic potency of suramin was tested by injecting it intravenously into mice infected with *Trypanosoma equiperdum* the response being taken as the proportion of mice free from trypanosomes on the 3rd day after treatment, the RD50 was found to be 0.43 (0.36-0.50) γ per gm., and the slope of the log-dose probit-response curve was 18.3 ± 6.0 .

"4. Tests are described by which it can be ensured that the toxicity of a tested sample of suramin does not exceed that of a standard preparation by more than 20 per cent., and that its therapeutic potency does not fall short by more than 20 per cent.

"5. Suramin is hygroscopic and in moist atmospheres it will absorb water up to 40 per cent. of the original dry weight. The British preparation (antrypol) is issued with a water content of 11-14 per cent. Bayer 205 (germanin) as issued in ampoules appears to be anhydrous. When corrections are made for the different water content, the toxicities and therapeutic potencies of the two products are indistinguishable."

For the assistance of those who may wish to test the toxicity or therapeutic activity of any sample of suramin (antrypol, Bayer 205) two of Hawking's tables relating respectively to the toxicity and therapeutic potency of suramin, sample A, are reproduced. Sample A

was a batch of antrypol the moisture content of which was 13.8 per cent. No special steps were taken to prevent its taking up water but it can be assumed that it contained 14 per cent of water when the experiments were made. It should be noted that suramin is hygroscopic and that if left exposed to moisture it will absorb up to 40 per cent of the original dry weight giving the final product a content of 28 per cent water.

TABLE I

Toxicity of suramin sample A according to examinations made at Hampstead. The table shows the proportion of mice which died within three days of treatment with suramin

Dose mgm./gm.	Experiments with 2.5 per cent. solution			Total 2.5 per cent. solution	Experiments with 4 per cent. solution					Total 4 per cent. solution
0.35	0/20	0/20	—	0/40	—	—	—	—	—	—
0.42	3/20	1/20	3/20	7/60	0/20	—	—	—	—	—
0.50	8/20	0/20	1/20	9/60	1/20	7/20	3/20	1/20	5/20	17/100
0.60	17/20	3/20	11/20	31/60	7/20	7/20	12/20	10/20	7/20	43/100
0.72	18/20	9/20	15/20	42/60	13/20	14/20	13/20	14/20	11/20	65/100
0.86	—	—	—	—	19/20	19/20	20/20	20/20	19/20	97/100
No. of experiments	1	2	3	—	4	5	6	7	8	—
Sex of mice	M	F	M	—	M	M	F	M	F	—

TABLE III

Therapeutic potency of suramin sample A

The table gives the proportion of mice which showed no trypanosomes in the blood on the third day after treatment

Dose γ per gm.	Exp 1	2	3	4	5	6	7	8	Total
0.52	9/10	10/10	8/10	7/10	8/10	8/10	9/10	11/11	70/81
0.43	—	—	6/10	5/9	8/9	3/10	4/10	8/11	34/59
0.39	0/10	9/10	—	—	—	—	—	—	9/20
0.36	—	—	0/10	3/10	1/10	0/9	1/10	1/11	6/60
0.30	0/10	1/10	0/10	—	—	—	—	—	1/30
0.24	0/10	0/10	0/10	—	—	—	—	—	0/30
Sex of mice	F	—	M	M	—	F	M	F	—
Log RD50	0.682	0.537	0.650	0.620	0.620	0.663	0.642	0.610	Mean 0.6260 ± 0.0349
Slope b	27.4	16.3	19.8	6.4	19.2	19.0	16.0	22	Mean 18.3 ± 6.0

$$y = 18.3x - 6.47$$

MAYZA (Salvador) Estadística de la enfermedad de Chagas en primer período comprobada por la M.E.P.R.A. hasta el 30 de Junio de 1940 [Figures of Chagas's Disease confirmed by the M.E.P.R.A. up to June 30th, 1940.]-*Presse Méd. Argentina* 1941 Dec. 17 Vol. 28. No 51 11 pp

The number of cases of Chagas's disease has increased with considerable rapidity in recent years, owing it is almost certain, to more careful examination revealing more sufferers rather than to actual increase in incidence. In 1937 SCOTT (*History of Tropical Medicine* Vol. 1 p. 538) was able to collect only 241 cases. By the end of June 1938 370 had been recorded, and in two more years another 260 making a total of 630. Of these 559 had been proved by direct blood examination 30 by xenodiagnostic methods, 22 by inoculation 10 by the Machado-Guerreiro reaction, six by biopsy of a gland, two by biopsy of the primary chagoma and one post-mortem. The distribution of cases by Provinces was —

	To 1938	To 1940	Total
Mendoza	106	67	173
Chaco	67	80	147
Santa Fe	64	31	95
S. del Estero	34	12	46
La Rioja	17	12	29
Catamarca	10	16	26
San Juan	8	17	25
Salta	14	7	21
Jujuy	17	3	20
Formosa	10	2	12
Tucumán	7	5	12
Córdoba	4	3	7
Corrientes	5	1	6
Necoquén	3	3	6
Entre Ríos	3	—	3
San Luis	1	1	2
Total	570	260	630

H H S

TALICE (R. V.) COSTA (R. S.) & MAYRA (J. A.) Estudio clínico y epidemiológico de focos de enfermedad de Chagas en el Dpto. de San José. [Clinical and Epidemiological Study of Chagas's Disease in San José Department of Uruguay.]-*Arch. Uruguayas de Med. Ciruj. y Especialidades* 1941 May Vol. 18. No 5 pp. 396-438 [Bibliography]

The authors give an account of their investigations carried out in 1938-40 as to prevalence of Chagas's disease in certain parts of the Department of San José. They give details of 49 cases in children between the ages of 4 months and 14 years. In the dwellings of these patients *Triatoma infestans* was abundant and fully half of these insects examined were harbouring the trypanosome. The parents and even many of the children are well aware of the characters and habits of these insects. Of the 49 examined, four had trypanosomes in their

blood seen in thick drop preparations or proved by xenodiagnosis 24 of the remaining 45 presented clinical symptoms and the haematological findings of the disease. None was suffering from the disease in an acute form all were up and about common symptoms were loss of flesh enlarged glands dacryoadenitis anaemia tachycardia monocytosis symptoms for which no cause other than the trypanosome infection could be discovered. There is little or no doubt that cases are more numerous than the authors findings would infer. The paper has an extensive bibliography of 59 references 38 of which are to papers of which Dr TALICE is the author or part-author

H H S

MAZZA (Salvador) & JÖRG (Miguel E) Anatomía patológica de casos mortales de enfermedad de Chagas. [Pathology of Chagas's Disease] —*Prensa Méd Argentina* 1941 Nov 12 Vol. 28 No 46 4 pp

LEISHMANIASIS

BRAHMACHARI (Upendra Nath) A New Organic Antimonial for the Treatment of Kala-Azar by Intramuscular Injection—Neostebene.—*Jl Trop Med & Hyg* 1941 Dec 1 Vol 44 No 23 pp 158-160

The author who introduced urea stibamine for the intravenous treatment of kala azar in India has now brought forward another product a derivative of p-amino-phenyl-stibmic acid with an anti mony content of nearly 41 per cent. which can be administered intramuscularly. This new compound, given the name neostebene has been administered in doses of 0.1 gm. twice a week in a series of 10 cases till a total of 1 to 4 gm. has been given. As far as it is possible to judge at present the treatment has been highly successful but a further report is promised when sufficient data to allow of comparison with other forms of treatment have become available

C M Wenyon

PANDE (P G) A Natural Case of Cutaneous Leishmaniasis in a Bullock in Assam.—*Indian Jl Vet Sci & Animal Husbandry* 1941 June Vol 11 Pt 2. pp 98-104 With 4 plates. [24 refs.]

The case recorded is that of a bullock which was purchased from a wandering cattle dealer in Assam. At the time of purchase the animal had several nodular lesions on the hind legs extending from the hock to the fetlocks. The owner stated that other animals of the batch were observed to have similar lesions on the feet and tail. About two months after purchase the nodules became transformed into sores in which condition they were first seen by the author. Examination of smears and sections of excised tissues revealed an infection with parasites which did not differ from *Leishmania donovani* or *L. tropica*. As oriental sore does not occur in Assam while kala azar is of common occurrence there the author favours the view that the parasite is *L. donovani* and that the case was one of kala azar in which ulcerative lesions of the skin have been described. The author's diagnosis of a leishmanial infection was confirmed by workers at the Calcutta School of Tropical Medicine.

C M Wenyon

the onset of the fever varied from 9 days to 8 months the highest titres were found in recent cases. In 38 cases diagnosed on clinical grounds the results were very much the same.

The fixation titres in 53 cases of former infection with endemic typhus are shown in the form of a graph whose trend can be gathered from the following average figures some of which are based on a small number of cases.

Months after infection	2	6	15	36
Complement fixation	1-512	1-64	1-32	1-8
Weil-Felix	1-80	1-80	1-20	1-10

The complement fixation titre rises later than that of the Weil-Felix reaction, but significant titres (1-8 and upwards) persist for long periods whereas significant Weil Felix titres of 1-160 are rarely seen after six months.

Similar tests were made in 20 active and 10 old cases of Rocky Mountain spotted fever. All of the old cases (8 months to 2 years) gave completely negative responses. Of the 20 recent cases 14 were completely negative and only one of the others reacted completely in dilutions higher than 1-2. The exceptional case reacted on the 14th day up to a titre of 1-256 this person had lived in a place where endemic typhus occurred and so may possibly have had a previous attack, or there may have been a relationship with the high Weil-Felix titre which was 1-20 480 on the same day.

The complement-fixation test is therefore regarded as being of considerable value in differentiating between endemic typhus and Rocky Mountain spotted fever it may be positive up to five years or more after the illness.

The results of the Weil Felix test in the cases of spotted fever are interesting they showed very great variations. In one case the reaction was completely negative on the 7th day the titre was only 1-20 in three cases tested on the 14th 18th and 21st days respectively. On the other hand it was 1-5 120 in one case on the 14th day and 1-20 480 in another case on the 14th day. In the cases of endemic typhus the results were far more consistent a titre of 1-1,280 or over was reached in every one of the 11 proved cases in which the test was made between the 9th and 35th days. In four old cases tested from 74 to 250 days after the onset the titre ranged from 1-40 to 1-1,280.

In the clinical differential diagnosis importance is attached to the rash which usually appears first on the body in endemic typhus and first on the extremities in spotted fever.

John W D Meyer

ROMERO ESCACENA (G.) BOLINCHES (J.) & ALVAREZ (M.) Estudio clínico y experimental del tífus exantemático.—Epidemia de Sevilla. (Segunda comunicación. [Clinical and Experimental Study of Exanthematic Typhus—Sevilla Epidemic. (Second Communication.)])—*Rev Clin Española* 1941 Aug. 1 Vol. 3 No. 2 pp 106-115 With 7 figs. [48 refs.]

[For an account of the first communication see this *Bulletin* 1942, Vol. 39 p 139.]

Five strains of virus were isolated by guinea-pig inoculation from persons suffering from louse-borne typhus fever. The blood was

taken between the 3rd and 18th days. Four of the strains caused scrotal reactions in guineapigs within 5 to 8 days. Passages of the virus were made chiefly through guineapigs and rats. Mice which were inoculated had inapparent attacks but their blood was infective to guineapigs.

Full details are given of the experiments the results can be summarized as follows —The virus corresponds to the murine strain in (1) the incubation period which was less than five days in some of the animals (2) the orchitic reaction in inoculated guineapigs (3) febrile relapses which were frequent and (4) the obvious febrile reactions in the rats. On the other hand it corresponds to the historic virus in (1) the incubation period which was more than six days in the majority of the animals (2) orchitic reaction seen only occasionally in the later passages of the virus (3) complete absence of orchitis in one of the five strains and (4) the mortality in rats which was very low.

The conclusion is reached that the strains are not really murine and that the responses observed in experimental animals are not decisive criteria on which to base the classification of the virus they represent merely the results of the adaptation of the virus to new kinds of animal reservoirs of infection.

One cross-immunity test gave an interesting result. A rat which had shown a slight orchitic reaction after inoculation gave a definite febrile reaction to further inoculation of the same virus four months later though the attack was much less severe.

John W D Megaw

MRUGOWSKY (J) *Typischer und atypischer Krankheitsverlauf beim Fleckfieber* [Typical and Atypical Cases of Typhus Fever]—*Med Klin* 1942, Feb 27 & Mar 6 Vol. 38, Nos. 9 & 10 pp 193–197 221–223 With 3 figs

The author had recently investigated more than 100 cases of typhus fever in various countries of Middle Europe he remarks early in the paper that the more one sees of typhus fever the more varied is the clinical picture.

The patients often thought that they had influenza and consulted the doctor only when they became seriously ill this condition was reached in most of the cases by the third or fourth day. The chief features of 28 patients seen before the appearance of the rash were — 16 had pain in the muscles usually of the calf 14 had a palpable spleen 13 had conjunctival injection 13 had a feeble pulse 12 had bronchitis 6 had swelling of the feet 5 had mental confusion.

The symptoms often suggested some other disease such as influenza acute pharyngitis appendicitis polyarthritis or nephritis.

Special attention is called to the occurrence of a pronounced remission or intermission of the fever which was often seen from the fourth to the seventh day and lasted a few hours. The rash was sometimes seen as early as the first to the third day especially in severe cases in two patients it was first seen on the tenth day and in one as late as the twelfth day. The systolic blood pressure was 90 mm or less. In several cases death occurred within two to four days of the onset in these cases the rash was petechial from the outset.

One remarkable case is recorded in which there was no fever till the 16th day on which the patient died.

The author states that no death from typhus has ever been reported in a patient who had been fully immunized by Weigl's method, but he does not regard other methods, such as that of Otto and Wohlrab as being so reliable
John W D Megaw

Lutz (Karl). Leber sporadisches Fleckfieber [Sporadic Typhus Fever].—*Muench Med Woch.* 1942. Mar 6. Vol. 69. No 10. PP 207-209

A description is given of the features of 41 cases of the disease seen in Leipzig. 36 of the patients were Poles, the rest were Germans. About one-third of the patients had catarrhal or follicular pharyngitis at the onset. In two cases appendicitis was simulated. In mild cases the rash was usually slight or fleeting, and in 16 cases no rash could be seen. Eleven of the cases were classed as ambulatory in none of these was a rash seen. 20 were classed as severe all but two of these had a rash. There were three deaths, only one of which occurred in the 36 Polish patients, whereas two of the five Germans died.

Two of the cases in Germans were ambulatory although the patients had never previously been exposed to the risk of infection and so could not have acquired immunity against the disease. All the patients gave positive Weil-Felix reactions in titres of 1-100 and over on the sixth day
John W D Megaw

WALTHER (G). Nachkrankheiten in der Fleckfieber Rekonvaleszenz. [Sequelae during Convalescence from Typhus].—*Klin. Woch.* 1942. Mar 21. Vol 21. No 12. p 269

Reference is made to recurrence of slight fever during convalescence, two to three weeks after the subsidence of the original attack, and to a form of oedema resembling urticaria or Quincke's oedema. The temperature may rise to 37.8°C. or exceptionally to 39°C., with headache, rapid pulse and malaise. After a day or two convalescence is resumed. The author attributes these conditions and similar conditions in other infective diseases, to the development of an allergic state and holds that the agglutinins and protective substances in typhus show a great increase after the disease has subsided, to be reduced again after about one month.

In one case fully described there was no evidence of relapsing fever to account for the febrile sequela, and trench fever was ruled out. This patient had polyneuritis together with urticaria after a typical attack of typhus
C. P.

PATISO-CAMARGO (Luis). Brote epidemico de tifo negro o exantemático en Bogotá. An Outbreak of Black or Exanthematic Typhus in Bogotá.—*Rev. Facul. de Med. Bogotá.* 1941. Dec. Vol. 10. No 6. pp 425-441. With 10 figs. on 4 plates.

Bogotá in Colombia, lies near the equator at a height of about 8,500 feet. Twenty cases, of which three were fatal, are reported as having been treated in the hospitals of the town during July and August, 1941. The Weil-Felix reactions against *Proteus OX19* were strongly positive in all and the virus, isolated from two patients and from blood collected from two patients, was identified as *Rickettsia prowazekii*.

An interesting reference is made to the occurrence of a devastating epidemic in the same area in 1630 the name *labardillo* (burning fever) was applied to this outbreak.
John W D Megaw

DURAND (Paul) & BALOZET (Lucien) Préparation d'un sérum anti exanthématique par inoculations de rickettsias de poumons de souris [Anti-Typhus Serum Prepared by Inoculation with Mouse-Lung Rickettsias]—*Arch Inst Pasteur de Tunis* 1940 Dec Vol 29 No 4 pp 363-388 With 1 fig [14 refs.]

Suspensions made from the lung of a mouse inoculated by the respiratory route contain as many minimal infecting doses as 10 000 000 to 200 000 000 infected guinea-pig brains Stated in other terms a mouse lung weighing less than half a gramme has the same virulence as fifty to a thousand tons of guinea-pig brains
Suspensions of living Rickettsiae prepared from the lungs of mice heavily infected with *Rickettsia prowazekii* or *R. mooseri* after suitable treatment were injected subcutaneously or intravenously into horses and asses

The protective powers of sera prepared in this way were found to be much greater than those of convalescent sera judging by the results of the intradermal test in which serum and infective agent are mixed before injection The Weil-Felix titres of the sera did not correspond to the responses to the intradermal tests
The curative value of the sera can only be judged by therapeutic tests on human patients
Details are given of the technique employed and of the findings these will be found very useful to workers who wish to investigate the possibilities of preparing a curative serum
John W D Megaw

SPARROW (H.) & MARESCHAL (P) Sensibilité de l'organisme humain vis-à-vis des rickettsias de typhus murin I de Tunis. [The Sensitiveness of the Human Body to the Tunis I Strain of Murine-Typhus Rickettsiae.]—*Arch Inst Pasteur de Tunis* 1940 Sept Vol 29 No 2 & 3 pp 238-249 With 1 chart

The authors begin by emphasizing the need for a thorough investigation of the properties and stability of any living virus before it is taken into use for the protective inoculation of human beings. With murine typhus laboratory infections are difficult to avoid but these yield information about the safety of extending the experiments to human beings. Human subjects of experiments must be young persons who are in good health and are under constant medical supervision Care must be taken to ensure the purity of the strain which is used especially in the case of a laboratory situated in an endemic locality
The experiments now reported were made on young persons suffering from diseases for which treatment by pyretotherapy is useful. The vaccine was a suspension of living murine Rickettsiae obtained from the intestines of lice inoculated by Weigl's method. The doses are expressed in terms of the amount of virus contained in the intestine of one infected louse. Inoculation was by the subcutaneous route
The largest dose one louse intestine was given to each of five persons. In four cases there was a sharp local reaction at the site of the inoculation about the third day and febrile attacks started between the seventh and ninth days they lasted from six to ten days The

reactions to *Proteus* OX19 reached their highest titres (1-800 to 1-120,000) from the 10th to the 20th day. A rash was seen in only one case. It appeared on the sixth day and extended over the trunk and limbs. Three of the subjects were later found to be immune; the fourth was not tested. In the fifth case there was no reaction except that the Weil-Felix titre which had been 1-240 before inoculation rose to 1-32,000 after about a month. [This result suggests the possibility of immunity resulting from a previous attack of murine typhus.]

One patient was given a dose of 1/10 of a louse intestine. He had an attack of fever lasting 11 days and a generalized rash which appeared on the fourth day. The Weil-Felix titre was 1-12,000 on the 18th day.

Two persons were given 1/100 of a louse intestine. Both had inapparent attacks. In one case the Weil-Felix titre was 1-800 and in the other 1-24,000. Complete immunity was found in the one case in which the test was made.

Two persons were given 1/1,000 of a louse intestine. Another 1/100,000 and another 1/1,000,000. In these four cases there was no response of any kind and no immunity resulted from the inoculations.

Inoculation by instillation of the virus into the conjunctiva was tried in six persons. Five of these received doses of 1/100 of an intestine or less and no response followed. All were later found to be susceptible. The sixth person was given a dose of one louse intestine. After 17 days incubation he developed a mild attack of fever lasting six days. No rash was seen. The Weil-Felix titre reached 1-6,400 on the 28th day after inoculation and immunity was established. The seventh patient was given 1/30 of an intestine. He had no reaction except that the Weil-Felix reaction was positive 1-1,600 on the 34th day after inoculation. His immunity could not be tested.

Among the conclusions reached were—(1) Conjunctival instillations cause milder attacks with longer incubation periods than similar doses by the subcutaneous route. (2) Lice could not be infected by feeding on persons inoculated by the above methods. (3) Full immunity is established in cases in which the dose is sufficient to cause a positive Weil-Felix reaction even if the attack is inapparent. Immunity is not produced unless actual infection has been caused. (4) The severity of the attack is greater when large infecting doses are given than when the doses are only just enough to cause infection. (5) Individual differences in susceptibility occur and (6) Rats are more susceptible to murine virus than man. This conclusion is qualified by the proviso that it has only been proved to hold in the case of the virus "murine I" and of persons living in an endemic area.

John W. D. Megaw

SPARROW (Hélène). Abondance des rickettsias du typhus murin cultivées dans les poux. [The Richness in Rickettsia Bodies of Cultures of Murine Typhus grown in Lice.]—*Arch. Inst. Pasteur de Tunis*, 1940 Sept. Vol. 29. No. 2 & 3. pp. 250-261. With 1 chart.

Suspensions of the murine virus 1 of Tunis were made from the intestines of lice infected by Weigl's method. The virus had already undergone 275 passages through rats and had maintained a remarkable degree of constancy in its virulence for animals and human beings.

Varying doses of the living virus were injected by the subcutaneous route into 63 rats and 22 guineapigs. The extraordinary extent to which the murine Rickettsiae multiply in the intestine of the louse is shown by the fact that doses as small as 1/1 000 000 000 000 of an infected intestine caused infection in rats. This is comparable with the multiplication that takes place in lice infected with the historic virus. It suggests that the louse intestine at the highest degree of infection must contain something like a billion (English nomenclature) Rickettsiae and also that the ordinary methods of counting Rickettsiae give far too small results.

A suspension made from the brain of an infected rat contains only about 100 000 infecting doses for rats.

With very small infecting doses the febrile attacks in rats are much less severe than with large doses. Death never occurs yet the animals become solidly immune to both murine and historic virus even in cases in which the Weil Felix reaction remains negative and in cases which show no febrile reaction.

In guineapigs similar results were obtained. Fever and orchitis were produced in one animal which had been given a dose of 1/10 000 000 000 of an intestine. Immunity against historic virus was produced in another animal by a dose of 1/100 000 000 000 of an intestine.

John W. D. Megaw

DE MAGALHÃES (Octavio) & MORAIRA (João Afonso). Typho exanthematico em Minas Geraes. Aspectos clinicos. [Exanthematic Typhus (Tick-borne) in Minas Geraes.]—*Brasil Medico* 1940 Mar 30 Vol. 54 No. 13 pp. 185-202. With 13 figs.

[This is the first part of an article of which the second part was reviewed in this *Bulletin* 1941 Vol. 38 p. 449.]

The principal vector is believed to be *Amblyomma cajennense*. The disease is chiefly rural. It shows a great variety of manifestations and the mortality is not so high as has been suggested by previous records which have dealt chiefly with very severe cases.

Ambulatory forms with very trifling manifestations probably account for the immunity of large numbers of persons in the affected areas. The occurrence of very mild cases has been proved by the isolation of Rickettsiae from the blood in such cases. In permanent foci of the disease there may be long periods of silence followed by outbreaks in which attacks occur even in persons who have lived a long time in the affected localities.

The mildest forms of the disease are likely to escape notice. The only symptoms may be those of coryza or bronchitis. There is no enlargement of the liver or spleen. In cases of average severity there is headache and loss of appetite for a day or two followed by high fever with chills, prostration, injection of the conjunctivae, vomiting and irritability. The rash appears within two or three days, usually first on the shoulders. It may be difficult to detect or may be intense and generalized affecting the face, scalp, palms and soles as well as the rest of the body. The mind is clear, the urine has a trace of albumen. Low temperatures may occur but these are also sometimes seen in the most severe cases.

The grave form is the one that has been most often described. The onset is usually sudden with severe pains, vomiting, high or low fever, great prostration and sometimes delirium. Differential diagnosis is impossible at first but the early onset of severe nervous manifestations

is suggestive these may assume a great variety of forms. The swollen face and injected conjunctivae are also conspicuous features. Among 105 proved cases no rash could be detected in 11 per cent. The day of appearance of the rash was as follows in 101 cases 2nd, 5 3rd, 10 4th 20 5th or 6th 40 7th 4 8th to 10th 2 doubtful, 8 no rash seen 12. Persistent staining after petechial eruptions may be seen up to two months after the attack. The clinical signs and symptoms are given in detail they correspond to a striking degree with those seen in Rocky Mountain spotted fever

John W D Megaw

DURAND (Paul) GIBOUD (Paul) & SPARROW (Hélène) Inoculation pulmonaire du virus pourpré (fièvre des Montagnes Rocheuses) [Pulmonary inoculation of the Virus of Rocky Mountain Spotted Fever]—*Arch Inst Pasteur de Tunis*. 1940 Sept. Vol. 29 No 2 & 3 pp. 228-233 With 1 fig

Durand and Sparrow have already described the results of the pulmonary inoculation of certain rodents with the viruses of historic and murine typhus and of boutonneuse fever [See this *Bulletin* 1940 Vol. 37 pp. 572, 849.] The experiments now recorded were made with three strains of the Rocky Mountain virus obtained from R. R. Parker. One strain was highly virulent another was of moderate virulence and the third was of consistently low virulence. It caused no scrotal reaction and was rarely fatal to inoculated animals.

The results varied according to the virulence of the Rickettsiae. In the case of the highly virulent strain mice and rabbits reacted in the same way as to the Rickettsiae of murine typhus and boutonneuse fever by pulmonary consolidation with the production of abundant Rickettsiae after intratracheal inoculation of suspensions made from tissues of infected guinea-pigs. With the strain of moderate virulence the results were analogous to those obtained when using the historic virus this correspondence was shown by the necessity for adopting the preliminary measure of subjecting the invertebrate host to a procedure for the reactivation of the virus. The method adopted was to allow the infected ticks to feed for two days on a guinea-pig and then keep them for four days at a temperature of 33°C. After repeated passages through the lungs of mice this strain was found to retain its property of moderate virulence as shown by guinea-pig inoculation tests.

The strain of low virulence killed only four out of fifteen inoculated mice in two there was some degree of consolidation of the lung but no Rickettsiae could be found.

[This paper is a fuller account of the work previously reported and abstracted in this *Bulletin* 1940 Vol. 37 p. 849.]

John W D Megaw

DURAND (Paul) & GIBOUD (Paul) Essais de vaccination contre le virus pourpré (fièvre des Montagnes Rocheuses) au moyen de rickettsias tuées par le formol (souches pulmonaires) [Experiments in Vaccination against the Virus of Rocky Mountain Spotted Fever by Rickettsias obtained from Lung Cultures and killed by Formol.]—*Arch Inst Pasteur de Tunis* 1940 Sept. Vol. 29 No 2 & 3 pp. 234-237 With 1 fig

The results of the experiments by the authors on vaccination against historic typhus by Rickettsiae killed with formol suggested the present

experiments in which they used a vaccine prepared with the Rickettsiae of Rocky Mountain spotted fever obtained from the lungs of infected mice

Suspensions of the Rickettsiae in human or horse serum were used and a high degree of protection was demonstrated in inoculated guineapigs. Three Cynocephalus monkeys and six guineapigs were given suitable doses of the suspension by the intradermal route 25 days later all the animals were found to be protected against doses of infective material which caused the death of the control monkey in 11 days after 6 days of fever and the usual reactions in the guineapigs.

The vaccines caused neither local nor general reactions.

John W. D. Megaw

WOHLRAB (R.) [Immunizations against Typhus.]—*Med Klin* 1941
May 23 Vol. 37 P. 532. [Summary prepared for War Medicine
Chicago]

Wohlrab reviews attempts at preparation of effective vaccines against typhus pointing out that experiments with living vaccines did not produce practical results. The first vaccines prepared with killed rickettsias likewise were not sufficiently effective but Weigl produced an effective vaccine by infecting lice by means of anal clysters. This method enabled him to infect lice in the absence of typhus patients. After the lice have been infected they are fed for eight to ten days on persons convalescing from typhus. Then the vaccine is prepared from the stomachs of the lice. This vaccine is injected three times in five days. It proved its value in Poland in China and in Ethiopia. The protection it confers lasts for one to two years. Since the preparation of this louse vaccine is somewhat complicated search was made for simpler methods for the multiplication of rickettsias. Cox's method of utilizing the vitelline sac of the chicken embryo proved most satisfactory and was used by Otto for the mass production of *Rickettsia prowazekii*. The former method of killing by heating to 60°C. has now been abandoned because it impairs the antigen. Immunization is done by injecting the vaccine three times (0.5 cc once and 1 cc twice) at five day intervals. It was proved on guineapigs that the vaccine obtained by the chicken embryo method has practically the same degree of efficacy as has the louse vaccine of Weigl. However in eggs the growth of rickettsias is not always uniform and so it is necessary to continue Weigl's method as well. It may become possible to improve the quality of the vaccines after further research on the immunizing constituents of the vaccines that go into solution (perhaps toxins). Protective effects could be obtained with extracts from egg yolk and cell culture filtrates that were practically free from rickettsias. Experiments have been made also with a vaccine of Rickettsia mooseri but the heterologous immunity produced by it is of course somewhat inferior. Discussing attempts at passive immunization the author states that the production of immune serum in horses has been satisfactory only with R. mooseri but proved ineffective with R. prowazekii. [For details of the preparation of the Cox vaccine see this Bulletin 1942 Vol. 39 p. 381.—Ed.]

HITSCH (H.) Die Schutzimpfung gegen Flecktyphus und die zu ihr verwendeten Impfstoffe. [Protective Inoculation against Typhus Fever and the Vaccines Employed.]-*Med Klin* 1942 Apr 10 Vol 38, No. 16, pp 341-342.

This is an exceptionally clear and concise account of the more important methods of protective inoculation against typhus fever. The vaccines discussed have already been described in this *Bulletin* and there is no indication that German workers have yet discovered any new weapon in the war against typhus.

The author considers that Weigl's vaccine is the only one that has been proved to be successful on a large scale in human beings but he states that Cox's yolk-sac vaccine is equally effective in producing immunity in animals. He holds that a final judgment on the latter and other vaccines must await human experiment on a large scale.

John W D McGraw

LILLIE (R. D.) Pathologic Histology in Guinea Pigs following Intra-peritoneal Inoculation with the Virus of "Q" Fever—*Public Health Rep* 1942 Feb 27 Vol 57 No. 9 pp 296-306 With 1 plate.

Three strains of the virus, including the original *Rickettsia burneti* were used—the tissue reactions to all three were essentially similar.

Altogether 78 guineapigs were employed—the examinations were made at intervals ranging from one to twenty-five days after inoculation. Full details are given of the changes found in the various organs at all stages of the disease.

The chief features consisted of focal perivascular exudation chiefly of lymphocytes, but sometimes of monocytes and fibroblasts with vascular endotheliosis in the heart muscle lungs and several other organs.

In the lungs small foci "scarcely nodules" were found—these were characterized by a sparse leucocyte and predominatingly epithelioid cell exudate in the alveoli and by a lymphocytic and monocytic infiltration of the interstitial tissues. Later small granulomatous nodules made up chiefly of epithelioid cells were found and still later multinucleated giant cells were seen in some of the granulomata which were most abundant in the spleen, liver and vertebral marrow.

Compared with epidemic typhus fever and even with Rocky Mountain spotted fever focal lesions in the brain and spinal cord of the guineapigs were strikingly infrequent. In most cases only occasional small foci of lymphocytic infiltration were found in the meninges or in the choroid plexus of one or more ventricles.

John W D McGraw

GROOT (Hernando) MAYORAL (Pedro) & MARTÍNEZ (Luis E.) Resumen de observaciones y estudios sobre Bartonellosis. [Studies on Bartonellosis.]-*Rev Facul de Med.* Bogotá 1941 Nov Vol 10 No. 5 pp 377-402.

YELLOW FEVER.

SORER (Fred L.) Treatment of Yellow Fever—*Jl Amer Med Assoc* 1942 Jan. 31 Vol 118, No 5 pp 374-378

A general account of the subject with special reference to the blood chemistry and metabolism of the disease the clinical picture and treatment. Whilst the situation with regard to prophylaxis is very

favourable the therapy of yellow fever can be given in the words of Lins the disease cures itself or kills in spite of any and every treatment. Once yellow fever has declared itself there are no known specific serological or chemical agents of value although there are certain clear indications for symptomatic treatment and careful nursing is essential. E Hindle

LACKIE (F P) Yellow Fever Prophylaxis. [Correspondence.]—*Brit Med J* 1942, Feb 21 p 270

The writer of this letter who is Chief Medical Officer British Overseas Airways Corporation draws attention to the fact that although the possibility of air transmission of yellow fever is great it has never yet been proved that it has occurred. It is obvious that other methods of transport are liable to be incriminated the motor traffic between the Congo and Uganda and sea traffic between Africa and Asia have not yet received the attention they demand.

There is yet no uniformity in the regulations governing the period after protective inoculation at which persons are allowed to enter the various countries recent information shows that the periods are — India 23 days Uganda 14 Sudan 20 Kenya and Tanganyika 14 N Rhodesia 15 Egypt 21 (believed now reduced to 14) Bahrain 21 Scientific evidence points to 14 days as an ample margin for safety and it is hoped that uniformity may be reached. The necessity for vaccination well in advance of departure from a yellow fever country is therefore evident [In a comment on this letter HASLAM (*Brit. Med J* 1942 June 13 p. 738) points out that in N Rhodesia the period has always been 14 days, and that there is therefore, complete uniformity among the African Dependencies usually referred to as the East African Group] C W

RAND (Charles G) Immunity and Vaccination in Yellow Fever—*McGill Med J* 1941 Dec Vol. 11 No 2. pp 11-19 [71 refs.]

A general account of the subject dealing with the chemical and physical attenuation of vaccines biological attenuation the immune reactions produced by attenuated viruses and finally the application of these in Public Health. The author concludes that from epidemiological studies it seems probable that despite these excellent means of prevention yellow fever will remain endemic among certain species of jungle animals ready to attack any traveller so unwary as not to be protected by vaccination. E Hindle

PLAGUE

MEYER (K. F) The Known and the Unknown in Plague—*Amer J Trop Med* 1942 Jan Vol 22, No 1 pp 9-36 With 1 map [70 refs]

After a short introduction this article deals seriatim with the subject of the known and the unknown in plague especially sylvatic plague —
A. The Known — (1) Sylvatic plague exists in 12 Western States of the U.S.A. (2) Localized epizootics in ground squirrels (*Citellus*)

and prairie dogs (*Cynomys*) with high mortality have been definitely attributed to plague whereas tularemia and other diseases have been only sporadic. (3) These epizootics begin in spring rise in intensity during summer decline during autumn and disappear in winter if the rodents hibernate. (4) The epizootics may reappear periodically in the same area on the same ranch, but the factors determining this periodicity are not fully understood. (5) This periodicity of the epizootics led to the discovery of the persistence of sylvatic plague. The same burrows of infected squirrels yielded, 20 years later plague infected fleas. "Thus plague persists indefinitely in an area once invaded." (6) The plague bacilli isolated in these epizootics are of the same biological type as those in other continents of the world, have more or less uniform infectiousness for mice and guinea pigs and are not particularly pneumotropic. Strains of *P. pestis* isolated in California are Beta type "glycerine-negative Oceanic Race" organisms in contrast to the Alpha type "glycerine positive" "Continental Race." (7) Spontaneous infections or reservoirs exist among 31 rodents and rabbits in the Western part of the United States, of which 15 species belong to the ground squirrel *Citellus* genus. Prairie dogs constitute an independent reservoir in the Rocky Mountains. (8) Experimental infections have shown variations in the susceptibility of certain rodent species. It is argued that proven resistance of a given class of rodents is due to selection through the survival of naturally resistant individuals but immunity due to a previous attack of the disease cannot be ruled out. (9) A pestiferous vector flea has been found to be indispensable to complete the propagation of plague among wild rodents. These fleas vary according to the rodent species and they vary also in their capability of accepting infection. The mode of transmission of plague by the wild rodent flea is the same as that for the rat flea. (10) Any form of contact of human being with the rodents of enzootic sylvatic areas is connected with a definite but somewhat limited risk of plague infection. The clinical features of the plague so contracted do not differ from those arising in cases derived from a rat source and, if pneumonic plague is excluded, there is a case mortality of approximately 50 per cent.

B The Unknown.—(1) The appearance of plague among the wild rodents in North America was found relatively early by comparison with other endemic foci on the African Asiatic and South American Continents. That these foci were really in sequence with the Hong Kong epidemic of 1894 is almost universally accepted. "The belief that plague is invariably imported is an ancient traditional concept somewhat similar to the superstitions which consider the pest a punishment from Heaven." (2) If the mode of arrival of plague to the inland of America is unknown it is only proper to inquire into its possible spread. "At some time or other plague must have spread to occupy its present wide distribution but the distances between the various focal areas of rodent epizootics discovered during the past five years are enormous and contacts between different regions owing to mountains or deserts are absent. The agency of the flea vector is doubtless of prime importance. Cannibalism is not an established factor. Evidence of infection *per saltum* is not forthcoming leaving the spread of the disease as due to contiguity." "The survey activities during the past 30 years have focussed attention on the primary host—the squirrel, chipmunk or prairie dog" and only accidentally have data been secured concerning secondary spread to other rodents.

Little is known regarding the transmitting power and the species of wild rodent flea responsible for the occurrence of plague in human beings. (3) Another important unsolved problem deals with the mechanism of persistence and perpetuation of rodent plague infection or the carry-over from one season to another. Isolated data only are forthcoming either for the longevity of fleas or the length of time that fleas can harbour plague bacilli. (4) There are a great many other unknowns which should be made the subject of analysis. Among these may be mentioned (a) the value of preventive vaccination (b) the relative value of dead and living vaccines of serum and of chemotherapy (c) the value of different anti-rat measures. What may be theory to-day may become a fact to-morrow and *vice versa*.

JUNIOR (Marcelo Silva) Observações à margem das investigações sobre a peste em el nordeste brasileiro da autoria de Attilio Macchia vello [Observations regarding Investigations on Plague in North-East Brazil.]—*Brasil-Médico* 1941 Nov 15 Vol. 55 No 46 PP 762-771 With 1 chart & 1 fig

HENRIQUES (Athos) Método de laboratório na profilaxia da peste [Laboratory Procedure in Plague Prophylaxis.]—*Bolet. Oficina Sanitaria Panamericana* 1942 Mar Vol. 21 No 3 pp 227-230 English summary

All antiplague service should be centred round the laboratory which would concern itself with diagnosis preparation of vaccines epidemiology rats and fleas.

Rats—These are sent dead in 5 per cent creolin or other insecticide solution. Fleas are removed for identification. At necropsy fragments of liver spleen and lymph nodes should be taken up to a maximum of 30 rats triturated under sterile conditions in a mortar suspended in bouillon and inoculated on the scarified skin of rat or guinea-pig. These test animals may be subjected to Flit to kill their fleas.

Cages—The animals remain in the cages until dead or until the 17th day after inoculation.

Bacteriology—After death the inoculated animal is treated with Flit before autopsy. Smears are made from the lymph node liver and spleen to be stained by Gram's method. Culture is undertaken and then comes the verification of plague organisms as Gram negative vacuolated non-motile bacilli indole positive and giving a nitrite reaction with sulphanic acid and α naphthylamine. The main *Pasteurella* types to be differentiated are *pseudotuberculosis* which is motile ferments rhamnose in 48 hours at 37°C. and is not pathogenic for white rats *avicida* which ferments sucrose in 48 hours at 37°C and produces indole *pestis* which does not ferment rhamnose and sucrose in 48 hours is non-motile is pathogenic for white rats and not produce indole and which gives a nitrite reaction.

Fleas and Rats—Require identification.

Transport of suspected material—This may be in paraffin of melting point 42° to 44°C. Another very good method is to send the material in a test tube well covered and paraffined inside a thermos flask containing broken ice. Besides acting as preservative to the material the temperature of 0°C inhibits the proliferation of other organisms.

but allows of slow increase of *P. pestis*. Broquet's medium (calc. carbonate 2 glycerine 20 distilled water 80) is a preservative of fleas and allows of isolation of the plague bacillus after 6 days.

W F Harvey

MEDEDELINGEN VAN DEN DIENST DER VOLKSGEZONDHEID IN NEDERLANDSCH-INDIË. 1941 Vol. 30. No. 3-4 pp. 158-213 With 5 graphs.—Verlag betreffende de pestbestrijding op Java over het jaar 1939 [Annual Report on Plague in Java for 1939.]

Most of this publication is of purely official interest as a record of the activities of Government plague services. It deals with personnel and districts and provides the tabular data of epidemiology, mortality and prophylaxis.

One of the notable antiplague measures which has been consistently pursued in the Netherlands Indies is that of improvement (primarily anti-rat) of the dwelling houses of the people. During the year this kept well ahead of the extension of plague, in that rebuilding was completed in six sub-districts while in only two did plague infection appear for the first time. The number of improved dwellings increased by 54,399 to a total of 1,579,753 and of new-built dwellings by 57,895 to 962,448. A noteworthy fact was the drop in the number of plague cases 1,558 cases with 1,541 deaths in 1939 as compared with 2,107 and 2,083 deaths in 1938. Discussion naturally centres round the reasons for this fall. At least two factors seem to have been involved — (1) the acceleration of vaccination and systematic revaccination, not to speak of an immunoprobability derived from repeated yearly vaccination, and (2) the later appearance of the rainy season and a specially dry period during November and December. During 1939 the number of vaccinations was 1,818,503, which brings the total injections of Otten's living vaccine up to 9,296,237.

W F Harvey

BACILLARY DYSENTERY

POT (A. W.) VAN RAALTE (H. G. S.) & VAN DER SAR (A.). Bijdrage tot de kennis der bacillaire dysenterie op Curaçao. [Bacillary Dysentery in Curaçao.]—*Geschied. Tijdschr. v. Nederl. Indië*. 1942. Feb. 10 Vol. 82. No. 6. pp. 234-250

This is an account of the discovery of bacillary dysentery as a practically new disease on the Dutch West Indian island of Curaçao. Up to 1939 it seems to have been regarded officially as a rather unknown infectious disease. The mortality under the heading "diarrhoea and enteritis" gives the clue to the existence of the disease without its specific recognition. In the interval from 14th September 1939 to 1st March, 1941 however dysentery bacilli were cultivated 130 times from the stools of 118 patients. The types of dysentery were Flexner, Kruse-Sonne and Shiga-Kruse bacilli in descending order of frequency. As has been the case in Holland Shiga-Kruse bacilli have not been isolated. A connection between degree of rainfall and the occurrence of dysentery has not been made out. This will require further investigation, but it may be that actual infections have their incidence some time after the rainfall itself. A point which is rightly stressed is the mandatory habit

of the population of Curaçao of defaecating in the open but perhaps the mode of spread of dysentery bacilli is not by contamination of the drinking water which is chlorinated but by flies so prevalent during the rains.

Table 4 relates in detail to 33 cases of dysentery and sets out the patient's race (white or coloured) age the bacillary type days before admission intoxication desiccation acidosis anorexia tachycardia left-shift of leucocytes anaemia number of days in hospital duration of diarrhoea, complications and administration of serum. Clinical symptoms receive full consideration. Treatment consisted of (1) Counteracting toxic symptoms by subcutaneous infusion of Ringer's solution with glucose in which at the same time high doses of vitamins C and B₁ were dissolved (2) Vigorous administration of laxative during the first 24 hours followed by dietetic measures, (3) sometimes serum and sulphapyridine.

W F Harvey

LAPPING (D) Chemotherapy in Bacillary Dysentery—*Indian Med Gaz* 1942. Feb Vol. 77 No 2 pp 69-71

Preliminary observations showed that sulphapyridine was effective in resistant cases of bacillary dysentery so that a clinical trial on a large scale was undertaken. A total of 144 cases formed the subject of a comparison experiment. Most occurred on one estate.

Although facilities for complete bacteriological investigation were lacking the stools were suggestive of bacillary dysentery the majority were clinically Shiga infections. Cases were put on one of the following treatments—

- 1 Polyvalent anti-dysenteric serum
- 2 Sodium sulphate.
- 3 Sulphapyridine.
- 4 Sulphanilamide.

The last was discontinued after 19 cases had been treated as not sufficiently effective.

Serum treatment—The smallest dose was 40 cc some received over 100 cc. The intravenous route was employed wherever possible and, if necessary glucose-saline was injected simultaneously.

Sulphapyridine—The smallest effective dose was 3 gm. the average case required 8-15 gm. Commencing with 2 gm. and continuing with 1 gm. three hourly until general symptoms subsided.

The results were striking—

Treatment	Number of cases	Deaths	Deaths per cent.
Serum.	38	2	5.3
Saline.	31	9	29.0
Sulphanilamide	19	4	21.0
Sulphapyridine	56	1	1.8

From these figures it was obvious that sulphapyridine constitutes an effective treatment for bacillary dysentery. The sulphapyridine

series comprised 56 cases and the only death was of a marasmic child of two suffering also from malaria. The drug relieves pain within 12 to 18 hours. The stool becomes normal within 3-7 days.

The earlier in the disease sulphapyridine is exhibited the quicker the response.

P Manson-Bahr

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

FAUST (Ernest Carroll) The Prevalence of Amoebiasis in the Western Hemisphere.—*Amer J Trop Med* 1942 Jan. Vol. 22. No 1 pp 83-105 With 3 figs. (maps) [86 refs.]

The author has reviewed the records of amoebic infections in the Western Hemisphere though these are far from complete certain conclusions can be drawn. Amoebiasis exists in an appreciable portion of the population from Central West Canada (52°30' N latitude) to the Strait of Magellan (52° S latitude). It is much more intensely endemic in the American tropics than in the temperate zones. In areas like the United States the incidence may possibly average as high as 20 per cent., or double that of previously accepted estimates. A list of over 80 references concludes the paper.

C M Wenyon

WENRICH (D H) & ARNETT (John H) Results of a Protozoological Survey of Food Handlers at a Professional School in Philadelphia, Pa.—*Amer J Trop Med* 1942 Jan. Vol 22. No 1 pp. 107-115 [18 refs.]

At a school in Philadelphia food-handlers were examined for intestinal protozoa each year for seven years, 1932-1939. This resulted in 50 older and more permanent employees being examined on an average 3.2 times and 140 student-helpers 1.4 times. When the results of the first examination alone are compared the employees gave a higher incidence for most infections than the student-helpers, who again had a higher incidence than did 1 060 freshmen previously reported upon. There was an exception with *Entamoeba histolytica* which had an incidence of 10.7 per cent. amongst the helpers and 8 per cent. amongst the employees. The incidence obtained from the average of 3.2 examinations of the employees was considerably higher for most infections than that given by the single examination. The 21 cases of *E. histolytica* infection revealed no more gastro-intestinal symptoms than did others.

C M Wenyon.

MILLENRY (Henry E.) The Duration of Human Infection with *Entamoeba histolytica* and Other Intestinal Protozoa.—*J Parasitology* 1942. Feb Vol 28. No 1 pp. 83-94

Nine students who harboured *E. histolytica* were requested not to take any treatment and were re-examined at various intervals. In two the infection persisted 4½ years, in two for 3½ years, in three for 1½ years. Further observations were not possible. Complement fixation tests were negative in seven of these students examined with an

UNION OF SOVIET SOCIALIST REPUBLICS REP SCIENT RES WORK OF
 ALL UNION INST EXP MED [VIEN] FOR 1938-9 Moscow
 Leningrad, 1940 pp 114-115 [In Russian]—[Studies on
 Intestinal Protozoa.]

In this summary an account is given of work carried out with human
 and human intestinal protozoa in the Sukhum (Caucasus) laboratory
 of the Institute of Experimental Medicine Attempts to infect the
 hamadryad baboon [*Papio hamadryas*] with human *Balanitium coli*
 and *Giardia intestinalis* failed. An Erivan strain of *Entamoeba histo-*
lytica (pathogenic to 83 per cent of infected kittens) produced
 diarrhoea in a new-born macaque [*Macacus rhesus*] but no symptoms
 at all in a new born hamadryad baboon. *E. histolytica*-like amoebae
 isolated from various species of monkeys [unnamed] when inoculated
 into kittens proved to be pathogenic to them, thus behaving like the
 human strains.

Investigations were also made on the influence of the intestinal flora
 upon susceptibility to infection with *E. histolytica* In kittens and pups
 inoculated simultaneously with amoebae and dysentery bacilli the
 course of the disease was extremely severe after a short incubation
 period colitis developed, terminating in death after 3-5 days. On the
 other hand, in the controls inoculated with amoebae alone the percentage
 of infected animals was lower the course of the disease not so acute
 and pathologico-anatomical changes not so pronounced.

C A Hoare

CHOPRA (A. K. Makfuzal) Intususcption caused by Amoebic Dysentery.—
Indian Med Gaz 1942 Feb Vol 77 No 2 p. 85

CHOPRA (R. N.) & CHOPRA (I. C.) Treatment of Chronic Intestinal
 Amoebiasis. Use and Abuse of Emetine.—*Indian Med Gaz*
 1942 Feb Vol 77 No 2 pp 65-68. [13 refs]

This paper is based upon 1105 cases of intestinal amoebiasis treated
 by the senior author in the Carmichael Hospital for Tropical Diseases
 during the past 20 years
 Emetine injections are of little value in the treatment of chronic
 forms and of carriers. Its exhibition under these circumstances is a
 waste and abuse. Emetine is a toxic drug and it is too often given
 without due precautions. It is not now considered to be so specific
 as formerly and supplies are restricted on account of the war so that
 great care is necessary in its administration.

The chief indications for parenteral emetine therapy are acute
 amoebic dysentery and amoebic hepatitis with or without abscess
 formation but even in the acute stage the quinoline derivatives kurchi
 alkaloids and carbazone have proved almost as effective.
 Emetine injections are indicated when acute exacerbations arise in
 chronic amoebiasis then 3 to 4 injections of 1 grain each control the
 symptoms.

In chronic amoebiasis good results were obtained with emetine bis-
 muth iodide. One course may not be successful and several in

increasing doses may have to be given. This drug has all the depressing and toxic effects of emetine, and has not proved altogether satisfactory in Indian patients.

On the other hand, carbarsone vaitren, enterovioform and kurchil alkaloid are on the whole beneficial. *P Manson Baker*

GARCIA PALACIOS (Pedro) & LEROUX (Jacobo). Diagnostico y tratamiento del absceso hepatico amebiano. [Diagnosis and Treatment of Amoebic Liver Abscess.]—*Rev Med. de Chile* 1941 Feb. Vol. 69 No 2 pp. 67-74

JAMISON (J. E.) Notes on Cases of Chronic Diarrhoea and Vague Ill-Health, apparently due to the Flagellate *Giardia lamblia*.—*Jl Roy Army Med Corps*. 1941 Dec. Vol. 77 No 8. pp 320-323.

The paper gives an account of seven cases of giardia infection associated with vague gastric disorder or frank diarrhoea with periodic remissions. The fact that in all these cases treatment with atabrin by the mouth got rid of the infection as well as the symptoms appears to indicate that the flagellate is not without pathogenicity and that atabrin is a specific for the infection. *C M Wrayson*

RELAPSING FEVER.

CHAMBERS (A. D.). Relapsing Fever in Abyssinia.—*Trans. Roy Soc Trop Med & Hyg* 1942 Mar 6. Vol 35 No 5. pp 271-279

A description of relapsing fever based on 32 cases, which, with one exception, all occurred at Soddu in the Lake District of Abyssinia during July 2nd to August 19th 1941. The most outstanding clinical symptoms were hepatitis and dyspnoea. Nouritis was present in four cases. The cases were treated by injections of Neosalol, an Italian arsenical preparation issued in two forms, one for intravenous and the other for intramuscular use. Intravenous injections in fairly large doses acted more rapidly in causing the disappearance of spirochaetes from the blood than either intramuscular or smaller intravenous injections and no relapses occurred after the large doses. The examination of fresh coverslip preparations of blood was the quickest method of diagnosis. When fresh blood was negative, thick films were taken—up to 12 on one slide—and stained. This effects great economy in slides and stains. The intermediate host is assumed to be the louse since spirochaetes were found in the gut of two *Pediculus corporis* caught on a patient's clothes. *E Hinde.*

DAVIS (Gordon E.) WYNN (Harlin L.) & BECK (M. Dorothy) Relapsing Fever *Ornithodoros parkeri* a Vector in California.—*Public Health Rep* 1941 Dec 19 Vol 56 No 51 pp. 2428-2428.

Spirochaetes of relapsing fever have been found in *O parkeri* collected in the Fresno Kern and Stanislaus Counties of California, and the first case of human relapsing fever directly attributable to this

tick is reported all other cases in California have been reported from timbered regions at high altitudes the typical habitat of *O hermsi*. Spirochaetes have now been found in *O parkeri* from California Montana Nevada, Utah and Wyoming and the ticks have also been found in Colorado Oregon and Washington. The habitat of some of the ticks was the sandy floor of a cave previously all other collections had been made from rodents and the burrows of rodents or burrowing owls.

C IV

LEPROSY

LOWE (John) DHARMENDRA & SEN (N. R.) Epidemiological and Clinical Studies of Leprosy in the Bankura District of Bengal—*Leprosy in India* 1941 Oct Vol. 13 No 4 pp 127-134

A report on a study of the epidemiology of leprosy in a typical rural area in Western Bengal which was commenced in 1936 was published in *Leprosy in India* in 1938 [see this *Bulletin* 1938 Vol. 35 p 883]. The enquiry has been continued with the following results.

A treatment centre was attended by about half the patients but irregularly. Few of the infectious cases were isolated because of difficult local conditions. As the main object was an epidemiological inquiry no real attempt was made to control leprosy in the area and the work done can have had little influence on the leprosy position. A comparison with the situation four years ago may therefore be of value.

The total number of cases has fallen from 424 to 422 only and the incidence from 4.2 per cent. to 3.9 per cent. The proportion of lepromatous cases has declined from 22.6 per cent. to 21.1 per cent. not a significant change. There has been an increase in the proportion of lepromatous cases in children up to 14 years of age from 6 per cent. to 12 per cent. owing to the development of new cases in larger number than those who have moved into a higher age group. During the four years up to 1941 59 of the original 424 patients have died. 23 of these were lepromatous cases. The death rate in lepromatous cases was 25 per cent. against 11 per cent. in neural cases. Of 56 new cases 12 are lepromatous and 44 neural, 23 of the latter being children under 10 years of age while practically all the new lepromatous cases were between the ages of 5 and 24. Of the 44 new neural cases 11 had shown suspicious lesions in 1937. Definite evidence of contact with an infectious case was obtained in 45 or 80 per cent. Of the 56 new cases in 28 there was an infectious person living in the house and in 17 more a definite history of extra-familial contact with an infectious case. Forty-one of the 56 new cases have been found in families in which one or more had already been recorded.

A striking fact is that out of 328 neural cases found in 1937 only two had become lepromatous by 1941. In addition one later discovered neural case had become lepromatous all three being children living in contact with infectious persons. No adult neural case had changed its type. The majority of the adult neural cases were of the tuberculoid variety. Many of the lepromatous cases had become worse in addition to the 25 per cent. of deaths. The evidence indicates that 61 per cent. of the new cases originated early in life but it does not point to leprosy

acquired in early life being more severe than that commencing at a later age. These observations afford interesting information on the natural progress of leprosy in a rural area under close observation during four years. *L. Rogers.*

GÓMEZ PLATA (Carlos). Ideas generales sobre la organización de la campaña antileprosa en el país. [The Leprosy Campaign in Colombia.]—*Rev. Med. y Cirugía* 1941 July Vol. 8. No. 7 pp. 11-14 17-19

A very general account of the foci of leprosy in the country and the numbers in the two lazarettos Agua de Dios and Caño de Loro. At the former of these there are eight residents, five males and three females at the latter 145 of whom 106 are males and 39 are females. The municipalities in which lepers are found and their incidence per thousand inhabitants are said to be as follows: Campo de la Cruz 3.69 Manatí 2.83 Sabanalarga 1.22, Santo Tomás 1.2, Repelón 1.1 Barranquilla 0.3 *H H S*

ARAUJO (H. C. de Souza). A lepra infantil na Colombia. Séde e tipos das lesões iniciais. [Leprosy in Children in Colombia. Site and Type of Initial Lesions.]—*Brasil-Médico* 1940. Mar 9 Vol. 54 No. 10 pp. 145-151 With 4 figs. & 4 graphs. [15 refs.]

The author mentions 25 cases and gives short details of 20 of them. The ages of the 20 range from 3 years to 13½ (nine only are under 8 years of age). All but one of the 25 started with achromic maculae—indicative it is said of a certain degree of immunity—one only presented an initial leproma. Line drawings show the sites of these initial maculae in each of the 20 patients—most of them are on the trunk and lower limbs.

The author considers the question of congenital leprosy and mentions a child of 31 days with a circinate macula, a centimetre in diameter over the coccygeal region, which the mother asserted had been present at birth, and three nodules which appeared a fortnight or so later—one over the left deltoid, one on the inner surface of the left thigh and one on the right leg. The author intended to watch these for some days before taking a piece for biopsy but the mother became suspicious and disappeared, taking the infant with her. *H H S*

ALBARRACÍN (Leopoldo). La lepra frusta. Descripción. Su significado epidemiológico. Una historia clínica. [Abortive Leprosy Its Epidemiological Significance.]—*Bol. d. Inst. Vac. ds Hig. Sanper. Mariner* Bogotá. 1941 Dec. 2. No. 4 pp. 21-31

The author describes the case of a white woman of 27 years born in a leper district which in the past ten years has furnished a number of lepers in whom the bacilli cannot be demonstrated. She presented on the outer and upper aspect of the left thigh a macule some 10 cm. in diameter in which sensation to touch, heat and pain was absent. It had first appeared 15 years before when she was 11 years old, as a small spot attaining its present size in about a year. About the same time her nose used to bleed and there was a nasal discharge for about 8 months. This ceased and there was found to be a perforation of the

nasal septum 4 mm. in diameter with smooth edge there was no deformity The diagnosis is made from lupus and syphilis Six members of the family with whom she lived were lepers.

Epidemiological study of the patients in this district indicate that the disease is undergoing a change as though the subjects were acquiring a certain degree of immunity to the infection and cases such as this, in which the disease seems to come to an end spontaneously after a short period are increasing in number

H H S

SLOAN (T B M) & EBENEZER (Roy) Skin Grafts in Leprosy—*Leprosy in India* 1941 Oct Vol. 13 No. 4 pp 122-124 With 1 plate.

This is the record of a case in which after an operation for the removal of necrosed bone from the great toe sloughing of the skin over the ankle occurred with exposure of tendons When healthy granulations had appeared the wound was successfully grafted with small portions of skin removed from the left thigh The case is illustrated by a photograph taken after recovery

L Rogers

CHATTERJEE (K R) A Conservative Method of removing Terminal Phalanges in Leprosy Patients.—*Leprosy in India* 1941 Oct Vol 13 No 4 pp 125-126 With 4 figs. (2 on 1 plate)

The author advocates a conservative operation in cases of necrosis of the terminal phalanges with a view to preserving as much as possible of the soft tissues and also the nails. For this purpose he makes a horse-shoe incision along the sides of the digit and over the end of the last phalanx care being taken to preserve the nail bed which is included in the dorsal flap with just enough soft tissue to maintain its nutrition the ventral flap is formed by the pulp of the finger After the necrosed bone has been removed the wound is sutured and a terminal drain inserted. Secondary infection rarely causes much trouble and the results are good

L Rogers

GOMES (J M) *Lepra murina* Pesquisas com os pigmentos carotenoides [Murine Leprosy Research with Carotene].—*Brasil Medico* 1940 Mar 2, Vol 54 No 9 pp 140-143 English summary

For this investigation the author gave to 10 rats by injection into the right flank 0.5 cc. of a 0.2 per cent colloidal emulsion of carotene together with 0.5 cc. of an emulsion of Stéfansky's bacillus Five of them were given 0.5 cc. of the carotene suspension weekly till 2.5 cc. had been given Five were given the initial dose of carotene and bacillus but no after-doses of carotene Five others were injected with the organism alone as controls. One of each group was killed and examined on the 30th 34th 60th 74th and 95th days. In the second and third groups the disease was found to have progressed naturally the lesions being rather more active in the third the control group. In the first the animals showed fewer bacilli and in the last one killed on the 95th day the organisms could be seen only in the liver and spleen and here these were mostly fragmented The author believes that the

carotene" stimulates the evolution of the bacilli while it also stimulates the host's tissues to destroy the organisms in the early stage of the homogeneous acid fast stage
H H S

HELMINTHIASIS

LIMA (A. Oliveira) Alergia em helmintologia. Sobre o valor dos testes cutâneos para o diagnostico das helmintiasis. [Allergy in Helminthiasis the Value of Skin Tests in Diagnosis.]—*Brasil Medico* 1941 Dec. 27 Vol. 55, No. 52 pp. 845-848. [38 refs.]

The essence of this paper lies in the author's conclusions regarding the extent to which the helminthic antigens, whose preparation he describes, are reliable tests of the presence in the host of certain species of parasites.

As to trematode infections of man, positive skin reactions may be got in schistosomiasis when using an antigen derived from any mammalian schistosome or from *Fasciola hepatica* or *F. gigantica* and extract of a liver containing *Fasciola* gives a positive reaction in those parasitized by *Dicrocoelium*. With cestodes an antigen got from any species will react with any member of the genus [but zoologists do not guarantee to retain any particular species in any particular genus]. With nematodes, *Trichinella* antigen gives positive reactions when there is infection with *Trichurus* the antigens of *Ascaris* and *Trichuris* differ but a single antigen appears to cause reactions in all filariae. Instructions are given for the preparation of antigens.
Clayton Laure

RISQUEZ (Jesus Rafael) & BOZA (Fermín Velez) Nota preliminar acerca de algunas reacciones alérgicas observadas en casos de bilharziosis Manson. [Allergic Reactions in Schistosomiasis Manson.]—*Gac. Méd. de Caracas* 1941 May 31 Vol. 48, No. 10 pp. 289-290

In this preliminary note the authors state that an antigen was prepared from cercariae of *S. mansoni* obtained from washed *Planorbis guadeloupensis*. The full description of the method of preparation will be published later. This antigen was injected intradermally in a number (unstated) of persons of all ages, and as control an injection of the diluent, without the helminthic protein, was made. A positive reaction consisted of a zone of erythema with the formation of a nodule; there were no systemic reactions. The local reactions appeared, sometimes as early as 20 minutes after the injection, sometimes as late as 24 hours.

In all the cases of schistosomiasis the test was positive. In cases in which the disease was suspected it was positive in 92 per cent. In uninfected controls it was positive in 1 per cent. [definite figures of numbers tested are not given]. Further investigations are to be made in the meantime; the authors make no definite claims for this method as a diagnostic procedure.
C II

JOHNSTON (R. D. C.) Acute Haemolytic Anaemia following Phenothiazine Therapy [Memoranda.]—*Brit Med J* 1942, Feb 21 p. 259

The patient, a girl of seven, was given, for threadworm infection, phenothiazine 1.0 gm. twice daily, for five days, a total of 10 gm. Two

days after completion of this course she was admitted to hospital pale jaundiced and dyspnoeic. The haemoglobin value was 42 per cent. Transfusion of two bottles of stored blood followed by 1 pint of 5 per cent dextrose produced great improvement and next day the haemoglobin was up to 74 per cent the child recovered. Details of blood examinations are given. A sister of the patient had a similar but milder attack after the same dosage. The author points out that in 58 published cases of treatment with phenothiazine for threadworms eight showed some form of toxic reaction. He considers that in face of such a high incidence the use of the drug cannot be justified.

C IV

HOFFMAN (Wm. A.) & JANER (José L.) *Bufo marinus* as a Vector of Helminth Ova in Puerto Rico.—*Puerto Rico J. Public Health & Trop Med* 1941 Mar Vol 16 No 3 pp 501-504 [Spanish version pp 505-509]

The giant toad of Surinam since it was introduced into Porto Rico from Barbados and Jamaica in 1920-1924 and thence into Hawaii, Mauritius and Louisiana has satisfactorily fulfilled the object of its introduction by markedly lessening the numbers of white sugar cane grubs but it has been found to pass on unharmed through its alimentary canal numbers of eggs of *Ascaris lumbricoides*, *Trichuris trichiura* and *Schistosoma mansoni*.

Janer noted the presence of eggs of *S. mansoni* in the faeces of *Sapos* as these toads are locally named and on later examinations the writers have found eggs of roundworms, whipworms and schistosomes, all three species having viable specimens among them. The schistosome eggs are not the young of adults living within the toads for careful dissections have revealed none. They and the other eggs have been swallowed by the frog. Larvae of *Musca* and *Sarcophaga* flies feed freely on human faeces and the great multiplication of these flies and their widespread breeding in faeces passed by promiscuous defaecation provide links in the chain that carries the helminthic infections from man to man. *B. marinus* will eat these larvae and any ova contained within them and may thus pass on the ova. Yet it is believed that all in all *Bufo marinus* has brought to the island blessing far outweighing its drawbacks. Nevertheless it is at least a potential diffuser of certain helminthic infections. For of the faeces of 173 toads 26 contained eggs of *S. mansoni*, 31 of *A. lumbricoides*, 28 of *T. trichiura* and 13 of hookworms.

Clayton Lane

VOGEL (Hans) Ueber den Einfluss des Geschlechtspartners auf Wachstum und Entwicklung bei *Bilharzia mansoni* und bei Kreuzpaarungen zwischen verschiedenen *Bilharzia* Arten [The Influence of Sex Partners on the Growth and Development of *S. mansoni* and in Cross Matings of Different Species of Schistosomes].—*Zent f. Bak.* I Abt. Orig. 1941 Dec 5 Vol. 148 No 2/3 pp 78-96 With 4 figs. [12 refs.]

In order to experiment on the sexual development of *Schistosoma mansoni* the author infected mice or hamsters with male or female cercariae or with both sexes and checked his work by cross fertilizations between males and females of different schistosome species.

through that of an epithelioid cell nodule to the final healed fibrous body. There are in addition, chronic inflammatory changes leading ultimately to fibrosis, especially in the liver and colon.

"From the beginning, the disease is primarily hepatic and colonic. Pathologic changes are instigated mainly by the deposition of ova in the tissues—in the colon this leads to colitis and in the liver to cirrhosis, which is perportal in distribution. Splenomegaly develops, in part at least, secondary to portal obstruction.

"The involvement of the liver and colon, and of other viscera, increases rapidly with the severity and duration of the infection.

"The main anatomico-pathologic alterations due to schistosomiasis, as found in this series, are divided for purposes of description into cirrhosis splenomegaly colitis, pulmonary alterations, ascites, esophageal varices, retroperitoneal fibrosis, sclerosis and thrombosis of the portal vein and tributaries, bilharzial pigmentation, subserosal nodules of intestines, evolution of the pseudotubercles, and inflammatory changes due to schistosomiasis.

"The similarity of the late stages of schistosomiasis to the Banti syndrome is emphasized. Likewise the need for thinking of this disease in all cases presenting that syndrome, or evidences of cirrhosis, or gastrointestinal symptoms, whenever the subject has lived in areas of endemic bilharziasis."

Koppesch draws special attention to two deaths in a pulmonary infection and particularly to one in a girl of 14. Her sputum had sometimes been blood stained, and there had been coughing, night sweats and some fever. The cough became more marked after her eighth foudin injection. dyspnoea and cyanosis came on 12 hours later and she was dead in half an hour. At necropsy there were military bilharzial tubercles evenly distributed throughout both lungs and in certain sections necrotic worms were visible within the veins. [Were they not, as is seen in the dog with *Dirofilaria* so treated, embolic dead worms lodged in pulmonary arterioles after being killed by foudin? Compare also SHAW and GHAZAR this *Bulletin* 1938, Vol. 35 p 685]

Clayton Lane.

DAENGSAVANG (Svasti) & MANGALAKMAYA (Montri). A Record of Some Cases of Human Infestation with *Fasciolopsis buski* occurring in Thailand.—*Ann Trop Med & Parasit* 1941 Oct. 21 Vol. 35 No 1 pp. 43-44

A boy of six years had persistent diarrhoea, persisting abdominal swelling with ascites and enlarged visible veins and oedema of the abdominal wall, face, scrotum and lower limbs. With a good appetite he wasted, his stool being watery with undigested food in it as well as many eggs of *Fasciolopsis buski*. His body was stunted and his mind dull. Red cells numbered 3,290,000 eosinophils 6 per cent. and the haemoglobin was 65.

He had three treatments—the first two were with 0.3 cc. of oil of chenopodium every hour for three doses followed by half an ounce of saturated solution of magnesium sulphate, the second followed the first after an interval of 14 days. A third treatment was by an unofficial but well-known native anthelmintic. The worms recovered numbered respectively 141, 50 and 30—they varied in size but all were identified as *F. buski*. Several later faecal examinations showed no ova. He was the son of a gardener who cultivated water-caltrops. The authors interest led to the examination of the stools of the boy's family which contained the same eggs in the following numbers to the gramme of formed stool—mother 18,600 father 14,500 brother aged four 5,000.

brother aged two and a half 4 500 aunt 3,200 All but the last suffered from mild gastro-intestinal disorders and were treated with the Thai drug [It is regrettable that no hint of its identity is offered.] Clayton Lane

SCOLARI (Pedro G.) & OCAÑA (Tomas) Distomatosis cutanea [Cutaneous Distomatosis].—Rev Argentina de Dermatopsilologia 1941 Vol. 25 Pt 3 pp 369-376 With 5 figs

A girl of 10 had shown a number of fugitive swellings under the skin on the right side of the lower abdomen and buttock. These finally proved to be due to a distome. A swelling seen by the authors was about as big as a pigeon's egg was adherent to the skin in the lumbo-gluteal region but moved freely on the underlying parts. The skin over it was normal in colour but looked like orange peel. It was neither painful nor tender. Under local anaesthesia by ethyl chloride the tumour was excised in it lay a red clot and had two suckers one at the head end the other at the junction of head and middle thirds [perhaps an attempt to determine its species will be reported later] The host's tissue round it is described as having the character of a pyogenic and necrosing granuloma. Literature of other findings is mentioned but there are no definite references to it Clayton Lane

BONNE (C.) Vier echinostomen van den mensch in Nederlandsch Indië. *Euparyphium ilocanum* (Garrison 1908) *Echinostoma lindoensis* (Sandground en Bonne 1940) *Euparyphium malayanum* (Leiper 1911) *Euparyphium recurvatum* (v Linstow 1873) [Four Echinostomes of Man in the Netherlands Indies].—*Genera Typhlocyba v Nederl Indië* 1941 June 24 Vol. 81 No 25 pp 1343-1357 With 1 plate English summary [16 refs]

Four echinostome parasites of man are known in the Malayan Archipelago
Euparyphium ilocanum (Garrison 1908) in Java
Echinostoma lindoensis Sandground & Bonne 1940 in Central Celebes
Euparyphium malayanum (Leiper 1911) in Northern Sumatra
E. ilocanum is not uncommon in Java amongst inmates of insane asylums where occupational therapy with agricultural work is practised. The mental deficient patients are prone to eat any insect or small that attracts their attention including the snails of the ricefields harboured by echnostome-metacercariae. Its reservoir host is the field rat

E. lindoensis is extremely common in a few small villages inhabited by a primitive Toradja tribe on the shores of Lake Lindo in Central Celebes. Infection takes place by consuming mussels (*Corbicula lindoensis*) from the lake which contain the corresponding metacercariae. No reservoir host is known. This species has the largest size *E. malayanum* was found (± 750 specimens) at an autopsy of a Batak girl of 12 years in Northern Sumatra, by KLEIN ESSEVELD and

Echinostoma lindoensis would seem to be a more grammatical name.—Ed
(1138)

KOUWENKAAR and identified as malayanum by the author. Nothing is known about its modus of infection in Sumatra. This is the broadest species.

"E. recurvatum was only found once (± 20 specimens) in a lunatic in Java together with E. ilocanum. Its reservoir host is probably the field rat.

"It is quite possible that these echinostomes have a more general distribution in the Archipelago especially Ilocanum.

Diagnostic table for the four species.

	Ilocanum	Ilocoensis	Malayanum	Recurvatum
Length	4-10 mm	13-16 mm	5-10 mm	2.5-5 mm.
Width	0.5-1.5 mm	2-2.5 mm	2.3-3.5 mm.	0.4-0.7 mm.
Number of circum-oral spaces†	51	37	43	45
Length of circum-oral spaces	30-45 μ	70-85 μ	50-70 μ	30-80 μ
Anterior border of vitellaria	Far posterior to acetabulum	Near hind margin of acetabulum	Level with acetabulum	Posterior to acetabulum
Testes	Rounded or with indications of lobes	Lobes more distinct	Extreme development of lobes*	Rounded or with indications of lobes
Carthus pouch	Reaching half-way acetabulum	Reaching very little beyond anterior margin of acetabulum	Reaching beyond posterior margin of acetabulum	Reaching half-way acetabulum
Average length of eggs	103 μ	101 μ	137 μ ‡	91.5 μ
Average width of eggs	59.5 μ	60 μ	73.5 μ ‡	57 μ

Dependent on contraction and fixation.

† The number of circumoral spaces is subject to slight variation.

‡ Nothing like the very deeply and broadly incised testes of malayanum is ever seen in the other species.

§ The eggs of malayanum are easily recognized by their large size.

MICHIGAN PUBLIC HEALTH 1941 Aug Vol 29 pp. 153-155
 Swimmers Itch as a Problem of Northern Resort Lakes being met by
 New Program of Chemical Treatment. [Summary taken from
 Public Health Engineering 41st Washington 1941 Dec.
 Vol. 21 No 12 p 54. Signed F F ALDRIDGE]

Swimmers itch a problem of the lake resorts in Michigan and its neighbouring States, is characterized by inflamed skin areas and an intense itching that lasts generally from 4 to 7 days. Snails carry minute parasites known as Schistosoma cercariae which burrow into the swimmer's skin. The larvae of adult worms living in the abdominal veins of muskrats and various waterfowl are spread by defecation into the water thereby entering the snails and developing into the tiny wiggling cercariae. There are 3 possible control measures, namely —

- (1) Killing the muskrats and waterfowl.
- (2) Killing the parasites after they leave the snails.
- (3) By killing the snails.

Since the third method is the most practical, it has now been used successfully for three successive summers in Michigan's northern bathing beaches. The treatment consists of spreading a mixture of copper

sulfate and copper carbonate (two parts of copper sulfate and one part of copper carbonate) on the beach bottom by means of a power-driven pump and hose distributing equipment mounted on a boat. Since snails are sensitive to small quantities of copper they can be killed without harming the fish. An area of 1 000 square feet requires only 3 pounds of the above mixture the cost of materials generally being estimated at 15 to 20 cents per foot frontage of beach covered

McMULLEN (Donald B.) & BRACKETT (Sterling) The Distribution and Control of Schistosoma Dermatitis in Wisconsin and Michigan.—*Amer J Trop Med* 1941 Nov Vol 21 No 6 pp 725-729

There is no fully satisfactory method for killing in wide stretches of water the snails which are the intermediate hosts of those cercariae which cause bathing dermatitis. Further knowledge of the habits and natural enemies of these snails and of the life cycles of the flukes concerned may suggest better methods of their control. In the meantime the fish killing possibilities of copper sulphate have been greatly over-emphasized for a concentration of from 10 to 100 parts per million has been introduced into portions of these lakes with nothing but a temporary effect on local fish and any deficiency of these numbers is soon made good by those which come into the treated area from outside. The broadcasting of copper sulphate crystals was the simplest method of control used but its effectiveness diminished in water over two feet in depth and the combining of two parts of copper sulphate and one part of copper carbonate using three pounds of the sulphate-carbonate mixture per 1 000 square feet gave better results in the deeper water. The use of copper sulphate alone in shallow water up to two feet in depth helped to reduce the cost of the treatment. Repetition yearly of copper sulphate is essential. Until the problem is permanently solved the tourist and holiday industry is threatened serious outbreaks in boys and girls camps being particularly troublesome

UNION OF SOVIET SOCIALIST REPUBLICS REP SCIENT RES WORK
OF ALL-UNION INST EXP MED [VIEW] FOR 1938-9 Moscow
Leningrad, 1940 pp 113-114 With 2 figs. [In Russian.]—
[Lalo-Cyelo of *Diphyllodochtrium minus*]

One of the parasitological expeditions of the Institute of Experimental Medicine was engaged during 1938 and 1939 in helminthological investigations among the population of Lake Baikal. The present summary of unpublished work contains the first account of the complete life-cycle of *Diphyllodochtrium minus* a little-known human tapeworm first described by Cholodkovsky (1916) and since found to be endemic in the Baikal region. The cercidium hatches from the egg in the water and is ingested by *Cyclops strenuus*. In the body cavity of the copepod the first larva gives rise to a procercoid which differs in structure from the corresponding stage of *D. latum*. The infected copepod is eaten by fishes two species of lavaret and one grayling (presumably *Coregonus migratorius*, *C. lavaretus* and *Thymallus arcticus baicalensis* (Salmonidae)). The plerocercoid develops on the outer walls of the inner organs chiefly on the intestine of the fish. Man and other carnivorous animals become infected by eating fish containing living plerocercoids.

Clayton Lane

(August 1942)

In view of the fact that the local Mongolian population consume fish frozen salted or slightly grilled, the viability of the plerocercoids was tested under these conditions. It was found that at a temperature of -20°C . they remain alive for 48 hours when salted they live 8-10 days while in grilled fish they may survive for 20-30 minutes.

C A Howe

- i. SEGAL (L. J.) Cysticercosis Epilepsy treated with Sulphathiazole [Memoranda]—*Brit. Med. J.* 1941 Nov 15, p 683
- ii. LEIPER (R. T.) Diagnosis of Helminth Cysts in the Brain. [Correspondence]—*Ibid* Nov 29 p. 787

i. Segal reports that a man of 29 was found unconscious and admitted to hospital where after examination, a diagnosis of hydatid of the brain was made.

He had served in the Navy at one period on the China station, and there suffered from "a tropical disease". There set in mental depression and headaches which on seven occasions, passed into unconsciousness and fits with complete amnesia of the incident (so that his statement rests on what he was told about himself). Of symptoms pointing possibly to the brain there were mental dulness, a demand for sleeping tablets though he was asleep before they could reach him, blurring of the discs on the nasal side and knee and ankle jerks somewhat increased especially on the left. There was 6 per cent. eosinophilia, pressure on puncture was slightly increased but was not measured exactly. The Wassermann reaction was negative. X-rays showed in the left lung a cyst of about the size of a five shilling piece and a suggestion of an infected left maxillary antrum. Treatment with sulphathiazole gave great mental improvement. After a second course the eosinophilia disappeared.

ii. Leiper points out that with title of epilepsy from cysticercosis, the text gives a diagnosis of hydatid disease and suggests that the combination of the China station and a tropical disease point to infection with *Schistosoma japonicum* and call even yet for an examination of the faeces for these eggs.

Clayton Lane

- DAYSON (J.) Malignant Hypertension Associated with Hydatid Disease of the Kidney—*J. Path. & Bact.* 1941 Sept. Vol. 53 No 2. pp 207-212 With 4 figs. on 1 plate [23 refs]

"It has been shown experimentally that constriction of one renal artery will produce persistent hypertension with development of the characteristic lesions in the opposite kidney but not in the constricted organ. This case appears to furnish a close analogy with these experimental findings."

A woman of 25 died with a clinical diagnosis of chronic nephritis, and necropsy showed a suppurating hydatid cyst in the right kidney and a characteristic histological picture of malignant hypertension in the left. Her illness had lasted about two years, her blood pressure had been 220 mm. of mercury but in hospital it was 200/100 the urine showed 2 mgn. of protein to the litre and the blood 198 mgn. of urea in 100 cc. on admission, rising to 378 at her death 10 days later. At necropsy the right kidney showed at its lower pole a suppurating hydatid cyst, measuring 6 by 5 cm. containing necrotic scobes, a dilated renal pelvis with gross compression of the renal substance, partial obliteration of moderate sized branches of the renal artery and fibrosis of the

renal parenchyma. The left kidney showed a histological picture characteristic of hypertension—the glomeruli nearly normal in number but few being normal in structure about a quarter had focal necrosis many showed hyalinization a few were completely fibrosed and a number exhibited capsulitis and some haemorrhagic infarction the tubules were generally degenerate groups of convoluted tubules were full of necrotizing inflammation or intimal fibrosis afferent arterioles showed the larger branches within the kidney showed no change

Clayton Lane

GARCÍA CAPURRO (Federico) Diagnóstico radiológico de la membrana hidatídica encarejada importancia del signo de Ivanissevich. [X-Ray Diagnosis of the Retained Hydatid Membrane, the Importance of Ivanissevich's Sign.]—*Bol Inst Clin Quirúrg* Buenos Aires 1941 June-July Vol 17 No 141 pp 303-320 With 18 figs.

This paper emphasizes, with X ray plates and diagrams the condition reported by ITURRASPE [this *Bulletin* 1940 Vol 37 p 588] In a hydatid of the lung which has opened into the bronchial tree but in which the parasitic membrane and part of the fluid has been retained the X ray plates show a different appearance according to the direction in which the picture has been taken It is only when taken laterally that the cavity shows a polygonal outline

Clayton Lane

HEILIG (Robert) Practical Aspects on General Anasarca, especially in Malarial Nephritis and Hookworm Disease.—*Indian Med Gaz* 1941 Sept Vol 78 No 9 pp 519-523

At the Krishnarajendra Hospital Mysore ascites-anasarca cases are many They fall into three groups and their differential diagnosis as a guide to treatment is of vital importance The common causes are heart failure nephritis and hookworm infection. Heart failure is due to valvular disease or hypertension the latter is frequent among Brahmins strictly vegetarian for generations and is not discussed.

The nephritis is an acute or subacute glomerulo-nephritis Of six acute cases admitted over a period of 8 months and beginning characteristically as oedema of the eyelids and face four were young girls with acute malaria two tertian and two subtertian and the oedema, albuminuria and haemoglobinuria, as well as the ordinary malarial symptoms subsided under quinine The subacute cases gave a history covering a few months and showed albumen 0.25 to 3 per cent casts of every sort and red cells and a specific gravity nearly always between 1.015 and 1.018 [systolic] blood pressure in half the cases lay between 135 and 160 the diastolic being normal a large spleen floated in the ascites. Quinine in full doses got rid of the fluid, a table showing a loss of body weight of nearly 30 lb in 13 days.

The most frequent cause of the anasarca is hookworm infection The patients show a waxy grey puffy face tongue and palate looking like grey paper in the abdomen 25 or more punts of straw-coloured fluid nearly free from protein and with a specific gravity of 1.006 the legs and scrotum swollen. The heart signs are those of double mitral

disease but there is no dyspnoea or orthopnoea, no enlarged liver and no subicterus. The blood often shows haemoglobin 10 to 12 per cent to Sahli, the urine is normal unless there is complication.

"In these hookworm cases exists only one line of rational treatment to improve the blood condition so far that carbon-tetrachloride or tetrachlorethylene can be given without risk. Though hookworm anaemia is known as a typical microcytic-hypochromic anaemia that simply has to improve quickly on administration of sufficient doses of ferrous iron, some of our patients do not follow this rule. We give in every case 80 grains of freshly prepared Blood s pills per day and the effect is practically always a quick improvement progresses quickly and satisfactorily only in the majority of our cases, not in all of them. A minority remains that requires crude liver extract for further improvement these cases are characterized by a comparatively high colour index of about 0.8 whereas the simple iron deficiency anaemias have an index of about 0.35 to 0.5."

With this iron, and if necessary liver treatment is combined to save time this diuretic ammonium chloride grains xx, calcium chloride grains v five times, and urea grains v three times a day. Usually this treatment for three weeks raises the haemoglobin to 35 or 40 per cent and then antihelminthic treatment may safely be given "yielding innumerable hookworms (*Ancylostoma americanum*)". After this cure is not accepted until 3 motions passed on alternate days are free from hookworm eggs.

The importance of recognizing this infection is stressed in these words "apparently nowhere else—neither in Iraq nor in America nor even as near as the Madras Presidency are such desperate looking cases of hookworm disease to be found as we see here every day" [Such anaemia cases will be found as we see here every day" the Second Annual Report of the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease for 1911 and in Vol. 59 of the U.S. Senate Documents are reports by ARTHUR and IGARAVIDEZ with printed and pictorial evidence of the same kind for Porto Rico. To these hookworm campaigns of 30 years ago Porto Rico and the southern of the United States of to-day owe much. May the India of 30 years hence owe as much to the India of to-day] Clayton Lewis

DE SARAN (G. S. H.) & GUNewardene (S. R.) An Analysis of Forty Two Cases of Death following Anthelmintic Treatment.—*J. Ceylon Branch Brit Med Assoc* 1941 Sept. Vol. 33, No. 3 pp 235-294.

Between 1927 and 1936 there were administered in Ceylon 22,517,760 hookworm treatments with 42 officially reported deaths (about two in a million). Even if the figures of deaths are not fully complete the death rate was very small, further care may lessen it and mass treatment should be strongly pushed.

Of the 42 deaths, 33 were of children up to 13 years old, the other 9 were of persons between 17 and 65 in the children death occurred as early as 10 minutes and as late as 5 days after treatment. Every death is dealt with in text and table but details disappoint. Case 42, a lad of 17 is said in the text to have been given "1 oz. of tetrachlorethylene and in the table "dr x" yet for a man of 40 the reported dose was 1/2 oz. It is believed that some of the deaths resulted from concentrated magnesium sulphate solution given to the weak.

Clayton Lewis

HALA (H L.) Effect of Sulphapyridine on Roundworms in a Child with Pneumonia.—*Indian Med Gaz* 1941 Aug Vol. 76 No 8. p 482.

A child treated for bronchopneumonia with sulphapyridine (one half of a tablet [presumably 0.25 gm.] every 4 hours for two days and in reduced doses for the next five days) passed 148 roundworms [*Ascaris lumbricoides*] on three successive days. Stool examinations carried out two weeks later showed no ova. The author suggests further investigations since he has found treatment with santonin to be unsatisfactory.

BRICK (Miriam A) & DONOHUE (W L.) Granulomatous Lymphadenitis caused by Filariæ.—*Canadian Med Assoc J* 1941 Oct Vol 45 No 4 pp 315-317 With 4 figs.

A child of 4 born in China had been in Canada for six months and was suspected of being tuberculous having enlarged lymph nodes in the right axilla. These were excised and the condition displayed was found baffling till a section of a female *W. bancrofti* was seen.

The worm's surroundings were as they usually are and a microfilaria was also found. Whether the blood was later examined at night is not stated. Earlier examination had shown an eosinophilia of 58 per cent after operation it dropped to 2 per cent. She had frequent evening rises of temperature to 100 or 101°F.

Clayton Lane

I. EARLE (K Vigors) The Use of Sulphonamide Compounds in Filarial Complications.—*Med J Australia* 1941 Aug 23 28th Year Vol 2 No 8 pp 200-202. With 2 charts [13 refs.]

ii. — Filariasis of the Breast & Mammographic Study.—*Trans Roy Soc Trop Med. & Hyg* 1942, Jan. 31 Vol 35 No 4 pp 235-236 With 4 figs. on 2 plates.

i Sulphapyridine [M & B 693] was tested for this purpose on Nauru Island Central Pacific

During these complications microfilariae were present in blood films throughout the attacks. There are described three cases with lymphadenitis and lymphangitis one of funiculitis with scrotal cellulitis one of mastitis and one of teno-synovitis in the left forearm. All these reacted to the drug which was given every four hours two tablets for the first two doses and one for each of 9 to 11 more and in all cases the effects were striking. In one case of myositis and in two of filarial abscess good could not be attributed to the drug.

ii. The case described above as mastitis is here concerned. When the acute attack had subsided the affected breast (right) was X-rayed. This was one of many attacks in a woman of 52 in one of which the breast had been incised. In this attack it was enlarged the skin was red and tender and in one place tense with orange skin appearance.

The nipple enlarged and hard a tender mass in the upper and outer quadrant an enlarged tender lymph node just under the edge of right pectoralis major the axillary nodes were normal. Microfilariae were found in night blood, X rays showed increased density from fibrosis. Later injections of lipiodol into the openings of the mammary ducts at the nipple showed uniform patency and ramification.

Clayton Lane

[August, 1942]

EARLE (K. Vigora) Further Experiences with Sulphapyridine in Filariasis.—*Lancet*. 1941 Nov 29 pp 667-668.

"The strikingly beneficial effect of sulphapyridine on the lymphadenitis complicating filariasis probably indicates that the complication is due to secondary streptococcal infection rather than to the filariasis itself. The author quotes two cases, of lymphangitis and of cellulitis, in which rapid relief was brought about by this drug. In a third case of filarial myositis sulphapyridine was ineffective but recovery followed incision and the evacuation of dark greenish pus. Such pus is usually sterile and is regarded as filarial in origin thus differing from that found in true tropical pyomyositis, in which staphylococci are usually present.

C IV

VETTEL (Roberto) Onchocercosis. Los nodulos de localizacion dificil. (*Onchocerca caecutiens* Brumpt) (Nodules due to *O. caecutiens* and difficult to localize).—*Medicina* Mexico. 1941 Sept 25 Vol. 21 No. 398 pp 409-413 With 9 figs. on 3 plates

This paper from Mexico deals with the habitats of those *Onchocerca* worms that lie near the orbit and whose larvae enter the globe and produce blindness.

Vettel deals with three sets of habitats. 1 Periauricular nodules easily overlooked. 2 Nodules in muscles and attached to fascial planes. 3 Other deep nodules that remain undetected. Periauricular nodules may be superficial or deep. If they be behind the auricle they may push it forwards away from the head and one of the reproduced photographs shows this state present in one but not in the other ear while removing a superficial nodule of this sort it is necessary to look deeper along the external meatus for yet larger ones, and in doing so as many as five have been found in a single ear. The seriousness of this condition is evident from the statement that of 40 blinded persons periauricular nodules were present in all, and they are apt to produce oedema of face and ear the *Onchocerca* facies. The nodules on fascial planes on tendons and in muscles are detected with difficulty but as microphotographs show adult females and microfilariae may lie among striped muscle fibres. The deeper nodules, even superperiosteal or subperiosteal, are unlikely to be detected clinically. They even more than those located readily constitute a grave threat to vision.

Clayton Lane

MAUSS (Evelyn Abrams) The Serum Fraction with which Anti-Trichinella (*Trichinella spiralis*) Antibody is associated.—*Amer J Hyg* 1941 Nov Vol. 34 No. 3 Sect D pp 73-80 [10 refs.]

"The albumin and globulin fractions of immune trichinosis rabbit serum were subjected to 4 different tests for the presence of anti-trichinella antibody. The criteria used were complement fixation, circumlarval precipitate formation, reduced infectivity of larvae and protective power for mice. The results obtained by the use of each of these methods demonstrated that the immunologically active fraction of trichinosis rabbit serum was the fraction identifiable as

globulin. When the protein separation was effected by salt fractionation the indication was that the antibody is more closely associated with the euglobulin than with the pseudoglobulin fraction.

DEFICIENCY DISEASES

LEBLOND (C. P.) & CHAULIN SERVINIERE (J) Spontaneous Beriberi of the Monkey as compared with Experimental Avitaminosis.—*Amer J Med Sci* 1942. Jan. Vol. 203 No 1 pp 100-109 With 1 fig [18 refs]

Because so many of the symptoms and signs in human beriberi are not present in experimental vitamin B₁ deficiency in animals, the theory that thiamin deficiency is the sole cause of beriberi has been questioned. The appearance of spontaneous beriberi in a colony of monkeys (*Macacus sylvanus*) owing to the diet becoming partially deficient in thiamin provided an opportunity to investigate this point. Clinical signs of polyneuritis and cardiac failure autopsy findings of peripheral nerve degeneration and hydropicardium were found in all the 20 monkeys studied. Adolescents were first affected and in both these and the young the disease was fatal in adults the disease was more moderate and chronic. Thiamin therapy improved the condition but recovery from the polyneuritis was incomplete suggesting that irreversible changes had occurred. When thiamin free diets were given experimentally to two monkeys previously receiving the colony diet death was rapid (33 and 40 days) and occurred before any prominent nervous or cardiac symptoms could appear. The only two adolescents that were not seriously ill were given this diet developed acute symptoms and died within a few days. It is suggested that beriberi results only when there is partial thiamin deficiency [This is not a new suggestion. It was brought forward by J D GRAHAM as long ago as 1927 (this *Bulletin* 1928 Vol 25 p 433)]

H N Green

MACHELLA (Thomas) Studies of the B Vitamins in the Human Subject. III. The Response of Cheilosis to Vitamin Therapy.—*Amer J Med Sci* 1942 Jan. Vol. 203. No 1 pp 114-120 [10 refs.] [Summary appears also in *Bulletin of Hygiene*]

This paper summarizes the results of studies on 17 cases of cheilosis. Fifteen of these showed other signs of deficiencies in the vitamin B complex, 16 had anorexia and in three there was clinical and laboratory evidence of scurvy. The cheilosis varied in its response to treatment with different vitamins. 9 of 13 cases responded to pyridoxine. 2 of 3 to nicotinic acid. 2 (after unsuccessful treatment with riboflavin and pyridoxine) to brewers yeast. 3 (cases of scurvy) to ascorbic acid. Eight of these patients had received riboflavin without success. Cheilosis which is usually attributed to riboflavin deficiency has been shown by other workers to respond to the administration of other vitamins in B-complex. Whether the lesion can be caused wholly or in part by a deficiency of different vitamins or whether the treatment of one deficiency state by restoring the appetite brings about an increased intake of some substance which causes healing is not clear.

H N Green

The authors advise against adenylic acid for general therapeutic use as severe reactions are common including flushing of the face hyperpnoea tachycardia with electrocardiographic changes abdominal cramps apprehension and a sense of impending disaster Note is made that the exhibition of adenine sulphate has no apparent effect
H S STAMMIS

MISCELLANEOUS

PANAMA CANAL. Report of the Health Department of the Panama Canal for Year 1940 [STAYER (M. C.) Chief Health Officer]—PP vi+122.

V LUTTEROTTI (M.) Beobachtungen ueber Ulcus tropicum in Italien isch-Ostafrika. [Observations on Tropical Ulcer in Abyssinia.]—*Deut Trop Ztschr* 1941 Dec 1 Vol. 45 No 23 pp 697-712 With 5 figs [20 refs.]

The author classifies tropical ulcer into —(1) the primary phagedaenic type (2) the non phagedaenic type and (3) the secondary phagedaenic type. The primary phagedaenic ulcer may be of the kind which penetrates deeply through the tissues and this is the common form or it may fail to pass beneath the superficial fascia but may spread widely. These ulcers commonly commence in abrasions or small wounds and are most often seen on the lower part of the leg. Non-phagedaenic ulcers are not so common they may be superficial or may spread deeply they are usually very chronic and show little tendency to heal. These ulcers may arise from phagedaenic forms through the disappearance of purulent discharge and false membrane they present a granulating surface but epithelialization is extremely slow. Secondary phagedaenic processes may arise in tropical ulcers which have lost their primary phagedaenic character and have become torpid.

Of 82 cases seen by the author there was in 70 a history of trauma which provided the starting point in the other 12 it is possible that one slight injury occurred but was overlooked. Although trauma is frequently associated with the onset however other factors undoubtedly influence the development and nature of the ulcers and of these the state of nutrition the general health the climate and to some extent the race of the patients are important. The patients seen by the author were chiefly native soldiers and were of three types. Amharas who live at altitudes of 2,000 to 2,500 metres Gallas from similar heights and Sudanese from the region of Kassala. The Gallas appeared to be most susceptible and to show least tendency towards healing the Amharas were least affected. Living conditions were good and were the same for all, and the soldiers were all young and healthy.

In the civil population tropical ulcer is rare in the highlands and is rarer in the cool damp season of the year than in the hot and dry season. More severe forms are seen in the general population than in the soldiers especially among the Shenasha tribe who are badly nourished and in whom malaria is endemic. The author considers that yaws and syphilis play little part in the aetiology of the disease.

In treatment good results have been obtained with a dressing of 10 per cent. zinc oxide ointment, 10 per cent. ichthyol ointment and Metchnikoff's calomel ointment in the proportions 3 2 1 to which are added 5 per cent. xeroform and 2 per cent. iodoform. The ulcer should first be cleaned with a sharp spoon under Evipan narcosis. For chronic ulcers elastic strapping is useful. Prophylaxis consists of immediate attention even to trivial wounds of the legs. C II

BLANC (Georges) & BALTARAD (Marcel) Transmission du bacille de Whitmore par la puce du rat "*Xenopsylla cheopis*." [Transmission of *Pf whitmores* by *X cheopis*.]—*Presse Méd* 1941 Dec. 3-6. Vol. 49 Nos. 104-105 p 1293.

The following is a translation of a short account of a paper read at the Académie des Sciences Paris, on October 20th 1941 —

"The fact that infection with *Pf whitmores* is common to rodents and man raises the question of transmission by biting insects.

"The first results of experiments made with rat fleas seem to justify this hypothesis. The bacillus develops in *Xenopsylla cheopis* in a manner similar to that of the plague bacillus. It multiplies within the body of the insect, is maintained alive for 50 days at least and can be transmitted by bite or in the faeces.

It therefore seems possible to state that in nature infection with *Pf whitmores* can be transmitted from rodent to rodent if not from rodent to man, by the flea.

[In a later communication (*Presse Méd*, 1942, Jan. 7-10 p. 33 and *C. R. Acad Sci* 1941 Vol. 213, pp 670-672) the authors show that *Aedes aegypti* can become infected and can transmit by bite. They conclude that many arthropods can transmit that there is no specificity and that arthropod transmission (if it occurs) may depend on the habits of the arthropods those which pass most freely from rodents to man having the best chance of transmission.] C II

VINTON (K W) & STICKLER (W H) The Carnero, a Fish Parasite of Man and Possibly of Other Mammals.—*Amer J. Surgery* 1941 Nov Vol 54 No 2 pp 511-519 With 7 figs.

The carnero or candiru is a small member of the catfish family Pygidiidae. It is long and slender 5-6 inches long and a little less than a lead pencil in diameter. It is of the genus *Vandellia* and has a ventrally placed mouth with 5 teeth in the upper jaw and spines on the lower parts of each operculum. They are commonly ectoparasitic on Silurid fish living in their gills, where the teeth and spines start a flow of blood which is sucked up by the parasite. They bore into the urethra of persons when bathing and cause copious and severe bleeding. Animals may be similarly attacked. The species known to attack man is *V. platur*. The head and spines would seem to be under muscular control so that the fish can withdraw if it wills.

The treatment seems to be quite effectual, a preparation of the unripe fruit of the *jagwa* tree *Genipa americana*. "The centres of the smaller green fruits are scraped out, mashed and squeezed and mixed with water the strength of the preparation varying considerably. It

is taken by mouth. The patients may be nauseated but in a short time from a few minutes up to 2 hours the fish is dislodged. This remedy has been used by the natives for generations.

Several questions remain to be studied which the author mentions, among them the following: 1 How does the fish obtain oxygen while in the host's body? 2 How long can it live as an internal parasite? 3 Will it eventually leave the host of its own accord? 4 Is it really a blood feeder or are the injuries purely mechanical? 5 If the former what does it feed upon when it cannot find blood? [But if it normally lives in the gills of Silurid fishes there would be no time when it could not find blood.] 6 How does the jagua juice bring about dislodgement?

SWANZ (C B) McMAHON (J) & HADDON (A. J.): *Pyrethrum Powder as Preliminary Note on its Use in the Control of Insect Vectors of Diseases—East African Med J* 1942 Mar Vol. 18 No 12. pp 360-378

This paper contains a preliminary account of the effects of dusting with pyrethrum powder usually the standard fine or second grade on insect pests in houses in Kenya. When experimental huts measuring 11 feet in diameter and 7 feet high to the cloth ceiling were dusted at sundown with 1-2 oz of the powder no living mosquitoes were found during the next 12 hours or so. The mosquito populations in the treated huts remained from 42-68 per cent. below those in the control huts during the next three days and there was still an appreciable effect at the end of 30 days. Light dusting with pyrethrum powder in the houses of Africans in Nairobi also destroyed large numbers of cockroaches, bed bugs, house flies, beetles etc. Experiments in the laboratory have demonstrated its efficiency against fleas and lice. A further use has been to check fly breeding in pit latrines. The rather heavy dose of 3 oz of second grade powder per seat per week has proved successful in controlling well established fly breeding in 4 weeks. The authors advocate the extended use of the powder (a) for the reduction of vermin in native quarters (b) against loose fleas and lice in and around quarters (c) as an antimalarial measure against mosquitoes in quarters of all kinds (d) for the control of house fly breeding. No instances of any type of reaction to the powder have occurred among the thousands of Africans whose quarters have been treated.

MACHERSON (Ronald K) Harara among Australian Soldiers. [Correspondence]—*Med J Australia* 1941 Oct 25 28th Year Vol 2 No 17 p 493

Harara is described by THEODOR as an allergic reaction to the bites of Phlebotomus at the height of sensitization [see this *Bulletin* 1936 Vol 33 p 445]. Men of the Australian Forces have suffered severely in northern Palestine. Exposed skin becomes covered with hard weals up to one centimetre in diameter these may subside or may be replaced by blisters which may later become infected and in some cases the regional lymph glands may be enlarged and tender. C H

STRICKLAND (C.) & ROY (D. N.) Myiasis-producing Diptera in Man.—
Indian Jl Med Res 1941 Oct. Vol. 29 No 4 pp 863-865

Identification was made of 36 specimens from cases of human myiasis, between 1922 and 1941 the following flies were recognized — *Chrysomya bezziana* *Sarcophaga* spp., *Drosophila* sp. and *Apiocharia scalaris*. Most of the cases were of intestinal myiasis but nasal, ocular aural dental and cutaneous cases were reported. One of these flies only *C. bezziana* is blontophagous as a rule the patients complained of few symptoms, but in one case the larva of *C. bezziana* was found within the dura mater of the spinal cord. C IV

DES LIGNERIS (M. J. A.) The Production of Benign and Malignant Skin Tumours in Mice Painted with Bantu Liver Extracts.—
 Reprinted from *Amer Jl Cancer* 1940 Aug. Vol. 39 No. 4 pp. 489-495. With 5 figs.

Although the different races of man appear to be about equally subject to cancer there are pronounced variations in the local incidence of the disease among them. An example of this is the high frequency of hepatic cancer among the Malays and the Bantus of Africa. It occurred to Des Ligneris that an examination of liver extracts from Bantus with or without cancer and from Europeans might throw light on the matter. He prepared extracts and applied them to the skin of mice in the interscapular region according to the usual method for testing carcinogenic potency. In the first experiment 100 mice were painted with an extract of liver dissolved in petroleum ether. 21 of the mice survived for 8 months and of these eight had papillomata at the site of application, two of the lesions being cancerous. In a second experiment 300 mice were divided into three groups of 100. The mice of group I were painted with an extract of noncancerous European liver group II with a preparation from non cancerous Bantu liver and group III with an extract of cancerous Bantu liver. The results, recorded eight months later may be tabulated as follows —

Group	No. of Survivors	No. with Papillomata	No. in which Papillomata were malignant
I	72	0	0
II	73	6	2
III	71	7	3

Experiments with oestrogens have already proved that carcinogens may be of endogenous origin the experiments of Des Ligneris open a wider aspect of this problem.

Others have tested extracts of liver on lines somewhat like those of Des Ligneris and have attained comparable results. Among these investigators are KLEINENBERG NEUFACH & SHARAD [*Amer Jl Cancer* 1940 Vol. 39 p. 463] and HIEGER [*ibid* 1940 Vol. 39 p. 496]. Hieger obtained sarcomas in 12 among 367 mice at the site of injection of liver extracts. Harold Burrows.

CORDIER (Daniel) *Physiologie des climats désertiques et tropicaux. Lutte contre la chaleur* [Physiology of Desert and Tropical Climates Heat Regulation.]—36 pp With 7 charts. London Editions de la France Libre Ltd 4 Carlton Gardens SW1

The extension of fighting in the present war to most quarters of the world has placed a great additional burden on those responsible for the health and well-being of the troops. Now that operations are proceeding in all continents and under all latitudes a knowledge of body-heat regulation under conditions varying so widely in their physiological effects is essential. As a justification for this point of view the author in an introductory section quotes statistics for the war of 1914-1918. In a series of colonial expeditions the numbers of military effectives who died from maladies and other climatic effects were more than double of those who were killed in action or who died later of their wounds.*

The handbook deals with much of the work that has been carried out in recent years by various workers on the effects of environment on the human organism. The physiological characteristics of desert and tropical climates are reviewed. The circulatory variations necessary for thermoregulation under such conditions are discussed together with the effects of environment on perspiration both sensible and insensible. The salt and water losses caused by sweating are described and the necessity for the maintenance of salt balance under the influence of high temperatures is stressed. The effect of acclimatization in modifying the sweat secretion is illustrated by the results of different workers.

In conclusion some of the physio-pathological troubles caused by heat *vis* heat stroke exhaustion sunstroke and heat cramps are discussed. The author has performed a useful service by compressing much information into a small compass.

C G Warner

* This has been noted in all campaigns. The following figures (the nearest integer per thousand strength) are taken from Scott's *History of Tropical Medicine* quoting NORRIS & FARR —

Campaign.	Admissions.		Deaths.	
	Disease	Wounds.	Disease.	Wounds.
Ashanti, 1873-4	474	70	18	6
Zululand, 1879-80	739	12	25	2
Afghanistan, 1879-80	870	51	36	7
Egypt, 1882	554	29	8	7
Sudan 1885-6	1 100	47	29	10
Ashanti, 1885-6	49	—	0.5	—
Chitral, 1895	1,530	14	49	5
Nile 1898	1 101	57	36	16
South Africa, 1899-1901	746	34	69	42

In Great Britain notification is defective and to form an estimate of prevalence on the basis of notifications in the Gold Coast which must inevitably be grossly incomplete would lead to the formation of a seriously misleading picture. Comparison between miners and general population is only valid if samples of the population are examined as fully as the groups of miners. Extension of post mortem examinations and of sputum examination in all cases of chronic cough should be undertaken. Pre-employment X ray examination for miners would be valuable. It may be advisable also to test recruits with tuberculin, and to exclude from mine labour those who react strongly. In South Africa these strong reactors have been found particularly liable to break down with tuberculosis after a period of labour.]

P. D. Arce Hart

TROPICAL DISEASES BULLETIN

Vol 39]

1942

[No 9

SUMMARY OF RECENT ABSTRACTS *

VII HELMINTHIASIS

[Continued from p 513]

Nematodes

Ankylostomiasis Strongyloides and Ascaris Infections—OTTO *et al* (p 473) consider that zinc sulphate solution of specific gravity 1.18 is as efficient as saturated sodium chloride solution of specific gravity 1.2 in concentrating hookworm eggs but note that the straining of faecal material through cheesecloth reduces the efficiency of the method. In this they confirm LANE's objection to screening. Probably the most efficient method of using the zinc sulphate solution would be by combining it with centrifugal floatation according to Lane's procedure.

KELLER *et al* (p 474) have made a hookworm survey in the Southern United States and compare their results with those of a survey made in 1910-1914. They calculate that a reduction of 68 per cent in incidence has taken place but the infection is still wide spread, especially in the coastal plain and sandy soil areas of each State. The greatest prevalence was in persons aged 5 to 19 with the peak at age 15-19. About one-quarter of the infected persons had infections severe enough to produce symptoms. Negroes suffer less than whites in the same areas. The incidence in negroes was only one-quarter of that found in whites and the average intensity only half that of the whites. In comment LANE gives his opinion that the method of stool examination employed at the second survey (Stoll and Hausheer) was insufficient to disclose all infections. In the first survey faecal smear was used. In another hookworm survey BROWN and OTTO (p 476) note that the DCF technique with a saturated solution of common salt was twice as effective as the Stoll method in detecting infection. They investigated the question whether reticulocytosis due to hookworm infection predisposed to malaria since it is known that *Plasmodium vivax* is found much more frequently in reticulocytes than in normal red cells. No such predisposition could be detected but it is concluded that hookworm infection may well be a contributing factor in the illness of malaria and that either infection may predispose to other diseases even if neither is enough to produce marked anaemia.

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

OHAMA (p. 474) reports extensive but fairly light infection of children in part of Formosa.

BONKE and LIE KIAN JOE (p. 475) report four cases in which *Ancylostoma duodenale* were found within haemorrhagic patches inside the wall of the small or large intestine. It is noted that although *A. duodenale* were present in the intestinal contents they were not nearly so numerous as *A. americanus*.

CORT and OTTO (p. 476) discuss immunity in hookworm infection. There seems to be evidence that immunity is acquired, but that it does not become absolute and that it is subject to complicating factors of age diet and anaemia. The immunity is general, not local, is caused by specific antibodies and requires the continuous presence of worms for its maintenance. They suggest that severe hookworm disease in man is commonly due to the presence of the worms in hosts so undernourished or otherwise debilitated that the immunity factor is not wholly effective.

MAPLESTONE and MUKERJI (p. 114) discuss the value of tetrachlorethylene as an anthelmintic in hookworm infection, laying stress upon the safety of their standard dose (4 cc. for an adult) the low cost and the ease of administration. It is their conclusion as a result of a comparative test that tetrachlorethylene is a better drug than thymol (given in doses calculated to the nearest gram on the basis of 60 grams for 150 pounds of body weight) on the grounds of lower toxicity, lower cost, greater ease of dispensing, less time taken in completing a treatment and greater efficiency. The body weight of the Indians treated was usually considerably below 150 pounds. In comment LANE states his opinion that thymol is still the safest of efficient anthelmintics and that it has been given in the full dose of 60 grams to 50 000 Indians, regardless of body weight and without anxiety. He urges further re-examination of the subject.

HAHN *et al.* (p. 116) point out that in dogs anaemic owing to blood loss, absorbed iron is converted into haemoglobin with great rapidity, within two to three days if the dose of iron administered is very small, within four to seven days if it is larger. As the iron intake is increased the proportion absorbed falls rapidly, but as LANE points out in comment the total amount absorbed (as opposed to the percentage of the amount given) increases, though much more slowly. PAYNE and PAYNE (p. 477) have investigated the effect upon hookworm anaemia of (1) The administration of iron alone. This was followed by rapid increase in haemoglobin but this gradually fell thereafter unless the worms were removed. (2) The administration of an anthelmintic alone. This was followed by a slow rise in haemoglobin, which reached a satisfactory level in one to two years. (3) The administration of an anthelmintic supplemented by a small amount of iron. This gave the most satisfactory results in the maintenance of the haemoglobin level.

FAUST and DE GROAT (p. 118) report on a fatal case of *Strongyloides* infection in which was seen the relatively heavy invasion, of the deeper layers of the bowel wall and liver by filariform larvae derived from mother worms situated in the overlying mucosa. They note that self infection may result from (1) Perianal invasion by filariform larvae. (2) Invasion by filariform larvae of the mucosa of the bowel at lower levels or (3) at the level of origin of the larvae. (4) Massive penetration of the muscularis mucosae by unchanged rhabditiform larvae. Self infection may be reduced by measures of personal hygiene.

by adequate nutrition and haemopoietic stimuli and by treatment [Elsewhere Faust has suggested the following treatment —Medicinal gentian violet given before meals in enteric-coated tablets 1 grain (0.06 gm) three times daily until 50 grains (3.3 gm) have been taken. The dosage is the same for children as for adults. For refractory cases 25 cc. of a 1 per cent aqueous solution of the dye may be introduced by intubation into the duodenum with good results. See Stitt's *Tropical Diseases* 6th edition 1942 Vol 2 p 1286.]

GALLIARD (p 117) reports that in Tonking human infection with *Strongyloides* occurs but is not detected so often as hookworm infection. He discusses the possible agencies which may tend to limit the transmission of *Strongyloides* infection in spite of the apparently greater chance which this worm possesses by virtue of the multiplication of infective forms possible to one parasitic larva during the free-living cycle. He inclines to the view that particularly on transfer from one host species to another there is a great loss of viability and points out that in the dog there is extensive degeneration and digestion of the young as they pass down the intestine so that though abundant in the duodenum they may be absent from the stools. He notes that in 64 persons negative on direct smear faecal culture showed 43 to have hookworm and six to have *Strongyloides* infection but present methods in view of the probable digestion of larvae in the intestine are ineffective in diagnosis. In comment LANE suggests the use of the duodenal sound for *Strongyloides* and of a floatation method for hookworm diagnosis. GALLIARD (p 117) states that in Tonking *Strongyloides* infection in the dog and the cat is rare though pups are easily infected with human strains. Worms from human sources which have both direct and indirect cycles show only the indirect cycle in the dog.

BERGER and ASENJO (p 119) note that crystalline papain digests *Ascaris lumbricoides* *in vitro* in 0.11 per cent solution in phosphate-phthalate buffer of pH 5 papain completely disintegrated the worms in 18 hours.

PENEY (p 119) reports a case in which symptoms of meningitis together with turbid cerebrospinal fluid containing lymphocytes but no organisms were attributed to intestinal infection with *Ascaris*. Cure coincided with the administration of santonin [but it is noteworthy that the raised temperature had fallen considerably before treatment was instituted].

Filariasis —KOBAYASHI (p 520) gives a description of the organization of the microfilariae of *W. bancrofti*.

Since more microfilariae were always found in the blood than in puncture material from the sternum in a number of cases examined by day or night NAPIER *et al* (p 521) conclude that there is no evidence that microfilariae shelter in the bone marrow by day or that they are destroyed in the marrow. There is no evidence of bone marrow change in this infection.

By injecting blood which contained microfilariae of *W. bancrofti* into the blood stream of uninfected persons or of various animals HAWKING (p 147) has attempted to determine if the periodicity of the embryos depends on the presence of the adult worms. The results were not conclusive. It was repeatedly noticed that most of the microfilariae disappeared promptly from the blood.

MENON and RAMAMURTI (p 519) have studied *in vitro* the process of exsheathing of microfilariae of *W. bancrofti* from man.

of the microfilariae was good in citrated blood but there was no development or growth. Unsheathing was not caused by peptic digestion or alteration of physical characters of the medium but took place when the microfilariae penetrated masses of fibrin and leucocytes, apparently by mechanical means.

KONAYASI (p. 149) describes in detail the development of larvae of *W. bancrofti* in the body of *Culex fatigans*. The findings cannot satisfactorily be abstracted.

HAWKING (p. 148) gives an account of the distribution of filariasis in Tanganyika Territory. Infection by *W. bancrofti* is found along the coast and in the region of the Great Lakes. Infection by *A. persians* is largely found to the west and north of Lake Victoria, and is probably limited as a result of climatic conditions which govern the distribution of the vectors. Yet he notes that at Mwanza, where *W. bancrofti* is common *A. persians* is not found, while the reverse holds good at Kampala and points out that the climates of these two lakeside areas are very similar. *Culex fatigans* was found to be infected with *W. bancrofti* in high proportion at Dar-es-Salaam on the coast.

SORTISIMO (p. 518) gives a map of the distribution of filariasis on the island of Boeroe, Netherlands East Indies, where 51.8 per cent of the population were found to be infected, the filaria responsible being, apparently, *W. bancrofti*.

HU (p. 148) in Shanghai found infective larvae of *W. bancrofti* in 21 of 29 *Culex corax* fed upon a heavily infected patient but noted that extensive chitinization of the infective larvae occurred which may affect adversely the potential rôle of this species in transmission. He (p. 149) found that only one of 90 *C. bitaeniorhynchus* similarly fed harboured infective larvae but reports (p. 149) that 20.9 per cent. of *Anopheles hyrcanus* var. *sinensis* treated in the same way contained infective larvae. The same author (p. 520) states that in Shanghai *Culex pallidothorax* was found to be susceptible to experimental infection with *W. bancrofti* but as it is not a common household mosquito it is probably not an important carrier. YAO *et al* (p. 150) have shown that larvae of *W. bancrofti* may develop within sandflies (*P. chinensis* and others) to the post-sausage forms in the thoracic muscles.

HAWKING (p. 151) has tested the filaricidal action of a number of drugs. None had any action *in vivo* and of 35 tested *in vitro* only certain arsenicals and tartar emetic were effective, and these only in concentrations impossible in the blood of living animals. The essential disadvantage of *in vitro* tests is that many drugs do not exhibit *in vitro* the specific activities they possess *in vivo*. Chemotherapeutic research in filariasis therefore requires the use of some small filaria-carrying animal.

RAO and MAPLESTONE (p. 152) describe the adult male and female of *Microfilaria malayi* and propose to name this worm *Wuchereria malayi* in accordance with the specific name given to the embryo by Brug.

RAO (p. 518) reports a focus of *W. malayi* infection in the Central Provinces, India. Species of *Mansonioides* breed in most of the big tanks, all of which are covered by Pistia. In Galle, Ceylon about 10 per cent. of the population harbour filariae and DASANAYAKE (p. 152) reports that of the microfilariae found, about half were *W. bancrofti* and half *W. malayi*. *Mansonia uniformis* is prevalent in the *W. malayi* districts and *Culex fatigans* in the *W. bancrofti* areas.

HODGKIN and POYNTON (p 153) state that in the Federated Malay States the essential factor for transmission of *W. malays* is the presence of large numbers of *Mansonia* especially *M. longipalpis* and that this in turn depends upon the proximity of extensive uncultivated fresh water swamps within which the larvae obtain their water supply from the roots of trees. *M. longipalpis* is easily infected and in a series fed upon carriers of microfilariae the proportion infected was 96.62 per cent. Blood films from inhabitants of several districts showed microfilariae in 14 to over 50 per cent. There are reports that the injection of certain drugs into enlarged glands and the surrounding muscle is effective in reducing febrile attacks, and thus in retarding the development of elephantiasis. Such drugs are 1.0 cc of 1 per cent mercury cyanide or anthiomaline and favourable effects have been found with intravenous Mapharside but the authors stress the need for caution in appraisal of results.

KARIADI (p 520) states that in Martapoera Netherlands East Indies *Anopheles hyrcanus* λ is a carrier of *W. malays* though probably not so important as other mosquitoes.

DE SAVITSCH (p 521) describes the surgical treatment of elephantiasis of the scrotum and penis.

ANDERSON and LEHUCHER (p 155) report a case of onchocerciasis from La Goulette in Tunisia. HAWKING (p 522) has found onchocerciasis in a small proportion of the inhabitants of S W Tanganyika Territory. McMAHON (p 154) reports an incidence of 51 per cent of onchocerciasis in the S Kavirondo district of Kenya. The adult rate is higher than that in children but children may be infected at the age of four or earlier. Adult Simulium were collected in the riverine bush and pupae from the rivers practically all were *S. naves* and of 557 flies dissected, 49 were infected. Highest infectivity rates were found in lowest fly densities because in the latter there was more contact between fly and man. On the other hand human infection is greatest where the flies are most abundant as a rule flies are reluctant to leave the riverine bush but dense thicket is not attractive to them. No adult flies were found inside human habitations. HARRIS (p 522) gives details of the clinical findings in a focus of onchocerciasis in the S Kavirondo district of Kenya and notes that treatment by intravenous antimony sodium tartrate in persons from whom a nodule has been excised was followed by disappearance of microfilariae from the skin blood and by a fall in the proportion of eosinophils in the blood.

MOHR and LIPPELT (p 518) have tested the complement fixation reaction in various helminthic infections using as antigen a preparation from *Contortospiculum rheae* a filaria of the S American ostrich. The test was strongly positive in a few cases of *A. persians* and *L. loa* infections but negative in others and positive in certain persons from places where filariasis is endemic. It was also positive in a few persons with hookworm or *S. mansoni* infections in whom microfilariae were not found in the blood.

STEFANOPOULO and DANIAUD (p 156) report that in guinea worm infections, the complement fixation reaction and the intradermal test in both of which an antigen prepared from *Dirofilaria immitis* was used were positive for some months after cure.

Enterobius and *Trichinella* infections.—SAWITZ (p 156) quotes figures of his own investigations which show that a single NIH swab is much more efficient in the detection of *Enterobius* eggs than

centrifugal floatation with either brine or zinc sulphate solution. Additional swabs increase the efficiency of the method.

SAWITZ *et al* (p 523) in a study of the epidemiology of *Enterobius* infection, conclude that in children who sleep in large dormitories the infection is twice as common as in those in small rooms, that it is not lessened by keeping the house clean and that it has no relation to expenditure on food or maintenance. They consider that infection is passed on by direct contact but in comment LANE points out that air-carriage appears to fit all the facts. Eggs were found not only on clothes but also on ledges of pillars, windows and doors.

BROWN *et al* (p 523) found *Enterobius* infection in white boys in N Carolina but not in negroes though the hygienic habits of the latter are such that a high rate of infection might have been expected. CRAM (p 524) however found similar incidence in white and negro school-children but notes that in the whites the rate was much lower than that found in other comparable groups: these children were exclusively Jewish. In general the incidence in negroes has been much less than in whites.

D'ANTONI and SAWITZ (p 156) show that in certain children's institutions in New Orleans the enforcement of rigid hygienic measures failed to reduce the incidence of *Enterobius* infection. Treatment with gentian violet was given and resulted in a cure rate of 90 per cent. The dosage varied from 0.5 to 1 grain three times a day for 5-8 days or longer with repetition of the short courses and the drug was given in half-grain tablets of the kind which is claimed to dissolve in the caecum. Vomiting was common but did not immediately follow the actual dosing. MILLER *et al* (p 526) obtained cure in 90 per cent of children treated with gentian violet. The drug was given each day for 10 days in children aged six to nine two 3/20th grain tablets three times a day and in children aged 10 to 13 one 1/2 grain tablet three times a day. Vomiting was not common.

MAXSON BARR (p 516) writes of the value of phenothiazine in the treatment of *Ascaris* and *Enterobius* infections. [Later work by other authors, however has indicated that this drug may be dangerous.]

CATRON (p 167) reports *Trichinella* infection found in 14.7 per cent of routine autopsies at Ann Arbor Michigan. Diagnosis was made after digestion of 50 gm of diaphragm by pepsin and hydrochloric acid. LYSTER (p 158) states that commercial papain in normal saline is satisfactory for digesting trichinous meat. Papain extracts of larvae are as efficient as pepsin extracts in skin tests and precipitation reactions.

SAWYER *et al* (p 527) note that the clinical picture in trichiniasis may be misleading. They quote a case in which there was swelling of the eyelids, high fever with rigor and eosinophilia of 6 per cent.

ANDER *et al* (p 159) report that tetrachloroethylene administered to eight persons in whom the diagnosis of *Trichinella* infection had been made within three days of the onset of symptoms caused complete and immediate recovery. The most common symptoms were malaise, abdominal discomfort, fever, headache and oedema round the eyes.

OLIVER-GONZÁLEZ (p 528) has investigated the action of immune serum on the larvae and adults of *Trichinella spiralis*. In all the experiments it was found that precipitate formed in large masses

around the mouth of the larvae and was associated with immobilization disintegration and death of many of them. Precipitates were formed around the mouth anus and vulva of the adults. The time at which the precipitates appear varies according to the degree of immunization. Inactivated serum is as effective as unheated serum. Serum from rabbits immunized with saline suspensions of powdered larvae was apparently lethal to more than half the larvae exposed but had no effect on adults. MAUSS (p 529) describes experiments which indicate that immunity to infection with *Trichinella spiralis* is transmitted from infected rodents to their young. In hamsters this immunity was lost in about three weeks after birth and examination of the young animals failed to reveal actual infection so that it is concluded that the resistance shown by the young is not due to active immunity. The same author (p 528) shows that the infectivity of larvae is much reduced after exposure to immune serum. A similar reduction is found after exposure to normal saline but the addition of normal serum to the saline renders it largely incapable of reducing infectivity. MCCOY (p 529) shows that in unimmunized rats to which are administered living *T. spiralis* larvae there is rapid development of diarrhoea with the elimination of most of the larvae within 18 hours. The eliminated larvae are alive and as there is no sign of abnormal cellular reaction in the intestinal wall it appears that increased secretion of mucus and increased intestinal peristalsis are the chief factors in the expulsion of the larvae. Charles Wilcocks

RABIES

A REVIEW OF RECENT ARTICLES XXXVII *

1. Virus

Direct *in vitro* cultivation of street virus has been reported by PLOTZ and REAGAN¹. The medium was chick-embryo brain tissue in monkey serum Tyrode. The strain of street virus was obtained from a case of human rabies and it has been successfully cultivated through eleven transplants. Another strain from a rabid dog has similarly been cultivated through nine transplants. Twenty four hours after transplantation the plasma clot was found floating on the surface of the liquid medium and sections of the clot showed proliferating cells in contrast to the non proliferating cells which exist in the suspended cell medium. These proliferating cells provide a great yield of virus and experiments are being carried out to determine whether these cultures can be employed as a vaccine. Two cases of human rabies which exhibited symptoms of meningitic type are reported by DURAND². In one the incubation period was

* For the thirty-sixth of this series see this Bulletin Vol. 39 p 79

¹ PLOTZ (Harry) & REAGAN (Reginald) In Vitro Cultivation of the Street Virus of Rabies—*Science* 1942. Jan. 23 Vol. 85 No. 2458. pp 102-104 [10 refs]

² DURAND (Paul) Deux cas de rage humaine à forme méningée caractères particuliers du virus remarques sur les réactions méningées au cours de la rage animale naturelle ou expérimentale.—*Arch. Inst. Pasteur de Tunis* 1941 June Vol 30 No. 1-2. pp 85-78.

12 days, and in the other though there was history of frequent contact with a dog there was no indication that the patient had been bitten. In both cases post-mortem examination revealed marked meningeal congestion. The viruses obtained from the two cases were found to be identical, and were exhaustively examined by inoculation into rabbits guinea-pigs dogs cats rats, an ass a sheep a cow a pig, and hens and pigeons. Filtration experiments were also carried out and the resistances of the viruses to low temperatures and to glycerine were determined. In addition cross-immunity tests with strains of rabies virus were carried out. In all respects the viruses behaved as rabies virus.

ii Diagnosis

The diagnosis of rabies is discussed by STOVALL and PERRIN.² In their experience the paraffin section is more satisfactory than the smear and the delay in diagnosis occasioned is insignificant. They employ the eosin-methylene blue method of staining and draw attention to the advantage of keeping the solutions at a low pH.

Statistics relating to the correlation between inoculation of mice and microscopical examination of smears stained by SELLERS' stain (*Amer. J. Public Health* 1927 Vol. 17 p. 1080) are given by DAMON and SELLERS.³ An average of about 12 per cent. of specimens reported as microscopically negative were positive by the animal test. The percentage of microscopically positive specimens which gave a negative result on mouse inoculation was of the order of two to four.

iii Methods of Treatment and Statistics

The vaccinal properties of the clear supernatant obtained by iso-electric precipitation of 10 or 20 per cent. suspensions of sheep brain fixed virus (thereafter incubated at 37°C. for 24 hours) have been examined by VEERARAGHAVAN.⁴ The buffer solution employed was the glycine-acetate-phosphate system of NORTHROP and DE KRUIFF (*J. Gen. Physiol.* 1922, Vol. 4 pp. 639-654). Of 70 untreated guinea-pigs tested by inoculation of street virus into the deep muscles of the neck 58 died of rabies. Of 60 treated with 5 per cent. whole vaccine (Semple) 20 died whilst of 60 treated with the clear supernatant 23 died. Thus the clear supernatant has approximately the same immunizing value as the ordinary Semple vaccine. The nerve tissue in the precipitate had relatively little immunizing value.

In the United States of America antirabic vaccines killed by phenol or chloroform are prepared commercially. A study of the potency of some of these and of the consistency of samples prepared by the same firm, is thus a matter of importance. WYCKOFF and TESAR⁵ have studied a large number of these using both homologous and heterologous strains of challenge virus as a test dose. It appears that batches

² STOVALL (W. D.) & PERRIN (S. B.) Problems in the Laboratory Diagnosis of Rabies—*Amer. J. Public Health* 1942 Feb. Vol. 32 No. 2 pp. 171-175.

³ DAMON (S. R.) & SELLERS (T. F.) A Note on the Probability of Error in the Diagnosis of Rabies by Microscopic Search for Nerve Bodies—*J. Lab. & Clin. Med.* 1941 Oct. Vol. 27 No. 1 pp. 71-74.

⁴ VEERARAGHAVAN (N.) Elimination of Excess Nerve Tissue from Antirabic Vaccine—*Indian J. Med. Res.* 1941 Apr. Vol. 29 N. 2 pp. 303-310.

⁵ WYCKOFF (Ralph W. G.) & TESAR (Walter C.) The Potencies of Commercial Antirabic Vaccines—*J. Immunology* 1941 Mar. Vol. 40 No. 3 pp. 333-390.

from the same maker differ considerably as also do those from different manufacturers. Their results also show that testing by fixed virus will serve to eliminate the worthless lots, and give an approximate indication of their effectiveness against field strains of virus.

In a general article on rabies MOORE⁷ quotes certain statistics from New York City. During the period 1930-39 598 persons bitten by dogs which were proved to be rabid received treatment. Of these five contracted the disease. There were 15 persons who did not receive antirabies treatment following a bite proved to be by a rabid dog. Of the 15 two died or a mortality of 13.3 per cent.

Of 651 persons treated at the Pasteur Institute at Tunis⁸ during the year 1939 two died of rabies one on the 29th and one on the 34th day after commencement of treatment. No cases exhibiting post vaccinal sequelae were observed.

iv Paralytic accidents

A case of paraplegia following treatment by Fermi's vaccine is described by TYNDAL⁹. The patient had been an epileptic from childhood. Symptoms of paraplegia commenced 15 days after the beginning of treatment and by the 24th day had become general. Rapid recovery followed. The patient again came under observation some seven months later when it appeared that the symptoms of the old nervous lesion were considerably alleviated.

v Rabies in animals

JOHNSON and LEACH¹⁰ have repeated their experiments on the protection of dogs by single doses of chloroform treated vaccine containing 33.3 per cent of brain material [this *Bulletin* 1941 Vol 38 pp 164 and 496]. The experiments involved the use of 571 dogs of which 297 were treated and 274 served as controls. The data which are too lengthy to be recapitulated here are carefully set out and the statistical significance of the result is given in each case. This second experiment bears out the conclusions previously arrived at—that the chloroform vaccine as administered produced a high degree of immunity. No significant statistical difference between phenol and chloroform vaccine when the brain material was in the same concentration was observed. The antigenicity of chloroform vaccine was reduced by freezing and by drying *in vacuo*.

BALAZET¹¹ reports as in previous years on the results of vaccination of animals in Tunisia. During the year 1939 204 prophylactic doses 235 revaccinations and nine curative doses were administered. The service has been in operation since 1931 and throughout the whole period 3,277 dogs received a prophylactic dose and 1,274 were revaccinated. Amongst these no case of rabies has occurred. Of 56 dogs

⁷ MOORE (S. W.) Rabies—*Amer Jl Surgery* 1941 Aug Vol. 63 No. 2 pp 306-313 [10 refs.]

⁸ ANDERSON (Ch.) Service antirabique—*Arch. Inst. Pasteur de Tunis* 1940 Sept Vol. 29 No. 2 & 3 pp 328-342.

⁹ TYNDAL (Milo) Zur Frage der Paraplegien nach antirabischen Vakzine kuren—*Aied Klin* 1941 Nov 21 Vol 37 No. 47 pp 1177-1178.

¹⁰ JOHNSON (Harold N.) & LEACH (Charles N.) Studies on the Single Injection Method of Canine Rabies Vaccination—*Amer Jl Public Health* 1942 Feb. Vol. 32. No. 2. pp 176-180.

¹¹ BALAZET (Lucien) La vaccination antirabique des animaux en Tunisie du 1er janvier au 31 décembre 1939—*Arch. Inst. Pasteur de Tunis* 1940 Sept. Vol. 29 No. 2 & 3 pp. 343-346.

which received curative treatment none developed rabies, of 48 equidae 1 died and of 35 ruminants 4 contracted the disease. Similarly¹² in 1940 335 dogs received a prophylactic dose 103 were revaccinated, and 23 received curative treatment. Amongst these no case of rabies occurred.

A. G. McHardrick

OTTER VAN STOCKUM (Alara J.) Rabies Researches.—*Meded. Dienst d. Volksgezondheid in Nederl. Indië* 1941 Vol. 30 No. 3/4 pp. 111-157 [16 refs.]

This is an English version of the paper reviewed in this Bulletin 1941 Vol. 38, p. 498

MALARIA

PALESTINE DEPARTMENT OF HEALTH A Review of the Control of Malaria in Palestine (1918-1941)—40 pp. With 5 maps. Jerusalem Govt Printing Press [150 Mils.]

The control of malaria in Palestine during the 20 year between the two world wars was so remarkable an achievement that this very complete account of that work merits an honoured place in malaria literature. The political unrest that marked the years 1938 and 1939 and the subsequent arrival of very large numbers of susceptible military personnel were a severe test of the efficiency of the malaria control measures employed: they stood the test. Now the Palestine Department of Health is organizing courses of malaria instruction for military medical personnel as part of its army cooperation work, this report should be of great interest to participants in such courses.

The population of Palestine which in 1922 was 649 000 had increased by 1940 to 1 478 000 of whom 881 000 were Moslems and 484 000 Jews. The urban population forms 43 per cent of the whole. The great majority of the rural population consists of Arabs living in villages on sites that have been occupied for centuries, and which were determined by proximity to spring, well, or rock-cut cistern. The standard of living and nutrition of the Arab population is low: that of the Jews is considerably higher. Some 84 000 nomadic Bedouin and ordinary shepherds create malarial hazards. The migration of flocks in seasons of small rainfall, notably to the Jordan valley, is still a factor of importance in the epidemiology of malaria.

The physiography and climatic conditions are diverse for so small a country. Sand-dunes edge the flat fertile coastal plain and impede the run-off of water: marshes and pools result. The central hills are limestone covered with scanty soil, dry and barren. Winter rains erode holes in stream beds and seepages occur at foot-hills in the form of springs. The common water supply is from rock-cut rain-water cisterns. Swamps and seepages are common along the whole length of the Jordan Valley: this has always been one of the most malarious areas of Palestine and the Lake Huleh marshes still have an evil reputation. Late and heavy spring rains favour malaria throughout the country.

¹² BALOGH (Léon). La vaccination antirabique des animaux en Tunisie du 1^{er} janvier au 31 décembre 1940.—*Arch. Inst. Pasteur de Tunis* 1941 Dec. Vol. 30, No. 3-4 pp. 323-325.

Nine species of Anopheles are found in Palestine *A. bifurcatus*, *A. elutus*, *A. superpictus*, *A. sergenti*, *A. hyrcanus* var. *sinensis*, *A. algeriensis*, *A. multicolor*, *A. pharoensis* and *A. mauritanicus*.

The last three are rare and unimportant from the point of view of malaria. *A. bifurcatus* a domestic species breeding in wells and cisterns was formerly common in all towns and villages in all parts of the country throughout the year. It was responsible for nearly all proofing or oiling of wells and cisterns have almost eliminated this species from many places. Jerusalem was highly malarious. It is now free from malaria. *A. elutus* is the chief rural vector. It is in stagnant pools, wells, swamps, and reservoirs overgrown with algae. *A. sergenti* most commonly breeds in very slowly moving streams and in seepages under rocks and pebbles. It is most in evidence from September to November when *P. falciparum* malaria is most prevalent. *A. superpictus* most commonly breeds in eddies and backwaters of fairly rapid streams. Like *A. elutus* it begins to breed in March and continues until the onset of the heavy November rains. Its association with epidemics of malaria has been noted on many occasions. *A. hyrcanus* var. *sinensis* breeds in marshes. It is most abundant from April to June. *A. algeriensis* also breeds in marshes and is the dominant species in marsh areas from January to March. *A. bifurcatus* is the most dangerous species. *A. elutus*, *A. sergenti*, and *A. superpictus* are all important vectors. They breed freely and enter houses. *A. hyrcanus* and *A. algeriensis* are usually confined to the marshland in which they breed.

The experience of the British Expeditionary Force in 1918 showed that Palestine's evil reputation for malaria was not undeserved and justified the gloomy forecasts then made as to the health conditions of Palestine. Wisely conceived control measures and patient unremittant supervision have falsified those forebodings. The incidence of malaria throughout the country is now remarkably low. Nearly all urban areas are completely free from the disease and its incidence is almost negligible in most populated rural areas. By 1925 urban malaria was well under control. The spleen rate of Jerusalem had fallen from 44.3 in 1919-20 to 0.8 in Jaffa from 16.6 to 4.9 and in Haifa from 39.0 to 5.7. Since 1925 there has been continued improvement. The spleen rate of town school-children has fallen from 4.8 in 1925 to 1.2 in 1940. Of rural school-children from 12.0 to 5.4. In 1922 7.2 per cent of dispensary patients were suffering from malaria. In 1940 malaria patients formed 0.5 per cent of attendances. Malaria remains however a potential danger in many parts of the country. Neglect of routine measures may still result in severe outbreaks. As noted below there are still areas to be reclaimed.

P. vivax is most in evidence from June to September. *P. falciparum* from August to December. *P. malariae* is rare. The percentages of the three types found in blood films examined from 1922 to 1940 were *P. vivax* 67, *P. falciparum* 31, *P. malariae* 2.

Mosquito control in Palestine has been essentially antilarval. In towns all possible water-holding places are catalogued and inspected. Essential wells are mosquito-proofed, others are closed. Cisterns are provided with mosquito-proof tops. Other breeding places are regularly oiled. Residents of almost all towns and of the larger villages have cooperated. The rural malaria problem consists of the prevention of stagnation of water in summer of drainage and irrigation.

schemes and of filling and pumping operations. The annual spring cleaning contributions by villagers and settlers under trained supervision, the clearing of the smaller *wadis* near their homes, and the channelling and draining of small swamps and bad irrigation systems, make possible the satisfactory application of oil or Paris green. The use of irrigation channels in rotation making possible alternate drying of sets of channels prevents mosquito breeding. This system has been followed for generations in the neighbourhood of Nablus. Nablus has always been free of malaria though the disease is common in surrounding villages.

In all important drainage schemes channelling by dynamite is the method of choice but the soil must be wet—the cost is barely a tenth of that of manual labour.

Mosquito catching stations are now very widely used as a guide to mosquito breeding conditions.

Two underlying principles of malaria control work in Palestine are self-help and the welfare of rural cultivation. The prompt and energetic cooperation of the people is perhaps the most remarkable feature of anti-malaria work in Palestine. The people have seen the lasting effects of swamp reclamation and the benefits to health of proper irrigation and the rest. Some of the most fertile land of the country has been reclaimed and made healthy after centuries of waste.

Large zones of high malaria endemicity still remain to be dealt with—such are the Huleh and Naamein swamps the wide stretch of the Jordan valley and some extensive ravines. Their populations are sparse.

This successful control of malaria in Palestine has been carried out at very low cost. Direct anti-malarial measures cost about 1½d per head of the population per year. There is no separate anti-malaria service. The control of malaria is but one of the duties of the staff of the Department of Health. The cost of reclamation and major drainage schemes is of course additional. The value of the free labour contributed by the beneficiaries is also very large indeed.

The destruction of adult mosquitoes has been tried but it is neither widely recommended nor extensively used in Palestine as a practical measure of malaria control.

Norman White

POTENZA (L.) Estudio comparativo de los pigmentos bilharziano y malarico (Comparative Study of Bilharzial and Malarial Pigment).—*Rev. Policlínica Caracas* 1941 Nov-Dec Vol 10 No 61 pp 363-373. With 1 folding plate. 23 refs.

Human material from fatal cases of malaria in which the possibility of concomitant bilharzia infection could be excluded, and animals experimentally infected with *Schistosoma mansoni* afforded the material for this comparative study of malarial and bilharzial pigment. Very little difference was found between the two. Both produced a double refraction of polarized light. Morphologically there was little that could be called distinctive. The pigment in schistosomiasis is commonly dust-like in appearance—in malaria dust-like pigment is not rare. The small shot-like masses of pigment characteristic of malaria are not uncommon in schistosomiasis. The pigment in schistosomiasis is more circumscribed in the body than it is in malaria in which it is very widely diffused. In both diseases the pigment is

deposited in reticulo-endothelial cells Both pigments are derived from blood pigment [See this *Bulletin* 1935 Vol. 32 pp 126 127]

Norman White

KOMÁREK (J) & BREINDL (V) Das heutige Verhältnis *Anopheles* Tier Mensch in Mitteleuropa [The Complex *Anopheles*-Animal-Man in Central Europe To-day]—*Z angew Ent* 1941 Vol 28 Pt 2-3 pp 501-506 [Summary taken from *Rev Applied Entom* Ser B 1942 May Vol 30 Pt 5 pp 74-75]

Surveys in Bohemia and Moravia in 1940 showed that *Anopheles maculipennis* Mg var *typicus* occurred sporadically throughout the region but was more common in the hills than in the lowlands and that *A m messeae* Flni was numerous in summer in well watered plains and in river valleys *A claviger* Mg was limited to Bohemia where it was common in late summer and autumn in the lowlands of the Elbe and Moldau and occurred up to about 3 000 feet

The authors state that these *Anophelines* fed indiscriminately on man and any available domestic animals They were abundant in village cowhouses and almost completely absent from adjoining bed rooms but this was due not to a preference for the blood of the cattle but to the microclimate resulting from the warmth and moisture produced by these animals in the dark dirty ill ventilated and very warm cowhouses of the peasantry They did not occur in the cow houses on large estates which are airy light and clean and have whitewashed walls

It is concluded that these *Anophelines* are becoming semi-domesticated and that the adults tend to disappear from the field and to collect in villages Larvae were found in breeding places near villages but not in apparently favourable ones at a distance from them A newly emerged female seeking food is guided by the strong smell of cattle in the village where access to cowhouses is easy whereas bedroom windows are shut at night and the microclimate of the entrance to a dwelling is unattractive The presence of many males in cowhouses points to a search for shelter not food

HADDOW (A J) The Mosquito Fauna and Climate of Native Huts at Kisumu, Kenya—*Bull Entom Res* 1942 June Vol 33 Pt 2 pp 91-142. With 24 figs [20 refs.]

This paper contains a vast amount of data on the *Anopheline* and *Culicine* population of native huts together with an account of the climate of the huts in relation to that of the outer air The work was done in an area where malaria is hyperendemic among Africans and severe in the European and Asiatic populations blackwater fever is present Four identical huts similar in type to those used by the native Africans were built side by side about 100 yards from the margin of the papyrus swamp They were set about 4 ft apart with the eaves touching the doors directed inwards the whole being sheltered by a large tree To facilitate catching a hessian ceiling was inserted Using one hut as a control conditions were varied in the other huts and day catches and night catches of mosquitoes were

made. It was found that the temperature range in the hut was only about half that in a Stevenson screen about 50 yards from the huts; the temperature in the hut rarely falling below the level at which development of the malaria parasites in the mosquito is arrested. In the screen it frequently did so in the hours before dawn. Similarly the range of relative humidity in the hut was much smaller than in the screen, particularly in dry weather. Saturation deficit at night was always greater in the hut than outside. A hut crowded with natives was slightly warmer and its relative humidity somewhat lower than that of the control hut.

Catches made at intervals during the night showed that in the case of *A. gambiae* females there is a high population of resting mosquitoes at 7 p.m., a period of low entry from 8 to 10 p.m., a period of high entry from 11 p.m. to 5 a.m., and a sharp entry peak at 6 a.m. due to the arrival of females seeking shelter for the day. The results with *A. funestus* were similar, but the high rate of entry did not begin until 3 a.m. In both species mature females with group V ovaries enter mainly at dawn; males of both species are scarce during the night but enter in large numbers at 6 a.m. to rest during the day. Comparable data were obtained with a number of *Culex* species. *A. gambiae* and *A. funestus* are true house-baiting species. Females are abundant both by night and by day; males by day only. They enter both for food and for shelter. Day catches which include both males and females, give the best estimate of prevalence. In the day catches the great majority of Anophelines were taken on the ceiling, those on the walls preferred the lower and darker half.

The effect of numbers of human inhabitants in a hut was studied by making simultaneous catches in huts containing 1, 5, 10 and 15 Africans respectively. There was a very close relationship between the size of the human population and the numbers of females of biting species taken. Non-biting species did not discriminate between the huts. For example in two night catches the combined numbers of *A. gambiae* and *A. funestus* in the four huts were 135, 261, 430 and 529. A further comparison was made between huts containing five washed, and five unwashed, natives respectively. All the important biting species preferred the hut with the unwashed natives. For example in two night catches, 122 *A. gambiae* and *A. funestus* were taken in the huts with washed children, 223 in the hut with unwashed children. A hut with dirty clothing was preferred to a completely empty hut. In a comparison between a hut containing a native and one containing a calf *A. gambiae* and *A. funestus* were more numerous with the native, both by day and night. For example five night catches gave 450 *A. gambiae* and *funestus* with the native, 43 with the calf. In the hut with the native Anophelines formed 94 per cent. of the total catch, with the calf *Culex*es formed 85 per cent. of the total.

At Kisumu the local incidence of *A. gambiae* is dependent on local rainfall. A threshold figure of five inches of rain per month is necessary before an increase can take place. The seasonal incidence of *A. funestus* is not connected with local rainfall. Increases take place when the level of Lake Victoria Nyanza rises. This rise is dependent on the rainfall of a large part of East Africa and is independent of local rainfall.

† B. Wigglesworth

THOMSON (R C Muirhead) Studies on the Behaviour of *Anopheles minimus* Part V The Behaviour of Adults in Relation to Feeding and Resting in Houses.—*Jl Malaria Inst of India* 1941 Dec. Vol 4 No 2 pp 217-245 With 1 fig [13 refs.]

In the earlier papers of this series [this *Bulletin* 1941 Vol 38 p 335 1942 Vol 39 p 293] the author has been principally concerned with the behaviour of the mosquito in relation to the ecology of the breeding place. In the present paper he deals with some other aspects of behaviour namely the activity of *A. minimus* in houses in relation to feeding and resting. The main daytime resting places of *A. minimus* in Assam and Northern Bengal are inside dark native houses and coolie huts. The temperature humidity and light conditions in resting places are described and compared with those in a standard Stevenson screen and a typical cowhouse. At night the temperatures in cowsheds and coolie houses are practically identical but by day the mean maximum temperature in cowsheds is some 2 C higher than in the coolie huts and these are about the same amount cooler than the screen temperature outside. In laboratory experiments *A. minimus* showed no marked reaction when exposed to a choice of different degrees of atmospheric humidity. When exposed to a choice of temperature the chief reaction was a strong avoidance of higher temperatures. It is possible that this reaction may have some influence on the choice of daytime resting places. At sundown there is a strong attraction to light and most mosquitoes leave the house at this time. There is no similar reaction at dawn. Marking and other experiments showed that there is a considerable daily turn-over of the population of *A. minimus* in houses. About 90 per cent of blood feeding takes place after midnight under natural conditions and there is very little feeding activity during the two or three hours after sundown. During the hot damp monsoon season *A. minimus* takes two days to digest its blood meal and develop its ovaries ovipositing on the second night after feeding. In cold weather conditions this period is increased to from four to six days. After ovipositing *A. minimus* returns for a blood feed on the same night. The female lays more eggs per batch in the monsoon (average 137) than in the cold weather (average 82). *A. minimus* refused to mate in captivity and in unfertilized females there is no development of ovaries after a blood meal. In fertilized females one blood meal is sufficient for egg laying. Blood feeding takes place throughout the year and there is no state of hibernation in the cold weather. In captivity *A. minimus* feeds readily on various animals on the cow more readily than on the goat. The fatal upper temperature is 37-38°C for *A. minimus* adults whereas for *A. vagus* the fatal zone is 40-41 C. Laboratory experiments suggest that *A. minimus* survives longer at the end of the rainy season than in the hot dry spells before the rains.

V B Wigglesworth

THOMSON (R C Muirhead) Studies on the Behaviour of *Anopheles minimus* Part VI Observations on the Cold Weather Breeding Places.—*Jl Malaria Inst of India* 1941 Dec Vol 4 No 2 pp 247-255 With 3 figs

There has been much controversy about the importance of the cold weather breeding places of *A. minimus* in Assam and Northern Bengal

in relation to malaria transmission. The object of this paper was to put this question in proper perspective in the light of the author's recent work on the behaviour of this species. The development of eggs, larvae and pupae continues at the lowest mean temperatures (16°C.) likely to be encountered in a breeding place in the coldest part of the year. The output of adult *A. minimus* from a perennial river (these form the chief cold weather breeding places in Assam) was estimated by collecting all pupae in a measured length of grassy edge, transferring them to water in the laboratory with approximately the same mean temperature as the river and recording the number of females produced and the number of days which elapsed before emergence. In this way it was shown that in suitable breeding places there is a considerable output of females in January, the coldest month of the year. In one typical perennial river there was a tenfold increase in larval density between the early part of February and the early part of April. During this two-month period there was a thirtyfold increase in the output of *A. minimus* from the same breeding place. In the dry zone of the Dooms the most important cold weather breeding places are perennial seepages and small streams formed from them. It is considered that any anti-malaria scheme should, if possible, include control of cold weather breeding places from the beginning of the year or the beginning of February at the latest until they are regularly flushed out by the first heavy rain, when attention must naturally be turned to monsoon breeding places. The author considers that breeding in many perennial rivers in Assam can be most simply controlled by removing the grassy edge and exposing the bare banks to sunlight.

V B Wigglesworth

VISWANATHAN (D. K.) DAS (Sribas) & OOMMEN (A. V.) Malaria Carrying Anophelines in Assam, with Special Reference to the Results of Twelve Months' Dissections.—*Jl Malaria Inst of India* 1941 Dec Vol. 4 No. 2 pp 297-306 With 2 graphs

The authors summarize the results of dissection of 18,599 anophelines from different centres in Assam from July 1940 to June 1941. *A. minimus* is the most important malaria carrier with a sporozoite index of 1.4 per cent and an oocyst index of 1.6 per cent. *A. maculatus* is of some importance in Shillong. But though exceedingly abundant its preference for the blood of cattle renders it a very inefficient vector. *A. annularis* is considered a vector in certain parts of the Goalpara District. *A. culicifacies* and *A. philippinensis* are thought to be of no importance. Infected *A. minimus* were found from March to November.

V B Wigglesworth

RUSSELL (Paul F.) & RAMACHANDRA RAO (T.) On Seasonal Prevalence of Anopheles Species in South-Eastern Madras.—*Jl Malaria Inst of India* 1941 Dec Vol. 4 No. 2 pp 263-296 With 2 text figs, 6 charts & 3 figs on 2 plates [10 refs.]

The authors made extensive collections of Anopheles larvae and adults over a three-year period from March 1937 to February 1940 in the Pattukkottai taluk, Tanjore District, South Eastern Madras. This has an area of about 700 square miles which has recently been converted from a dry tract to a well-irrigated countryside. Routine

larval and adult catching stations were established and traps of special design set up to collect adult mosquitoes. Seasonal prevalences of the following 12 species are discussed: *A. aconitus*, *A. annularis*, *A. barbirostris*, *A. culicifacies*, *A. hyrcanus* var. *nigerrimus*, *A. jaykessi*, *A. pallidus*, *A. subpictus*, *A. stephensi*, *A. tessellatus*, *A. vagus* and *A. varuna*. These are related to meteorological and seasonal conditions. Most attention is given to *A. culicifacies*. This is most prevalent in August and September as a result of the advent of irrigation water in mid June. From September onwards the prevalence declines for reasons which are obscure. Temperature and humidity did not seem important in this area in determining the adult and larval population except perhaps during the coldest weather in December and January when the low temperature may have retarded breeding. The period of lowest prevalence was from February to mid June, when the breeding places except tanks and wells are rapidly drying up.

V B Wigglesworth

RUSSELL (Paul F) & RAMACHANDRA RAO (T) On the Ecology of Larvae of *Anopheles culicifacies* Giles, in Borrow-Pits.—*Bull Entom Res* 1942. Jan Vol. 32 Pt 4 pp 341-361 With 6 figs & 1 plate

In the Tanjore District of Madras borrow pits form a main breeding place of *Anopheles culicifacies*. As these seepage-filled borrow pits become older there is a progressive decline in the density of breeding, the largest numbers of larvae being found soon after water enters the newly dug pits. It is shown that this difference is due to increased oviposition by the female in the newer pits. The factors of rainfall, predators, macroscopic vegetation, hydrogen ion concentration, carbon dioxide dissolved, oxygen, alkalinity, hardness, chlorine, ammoniacal nitrogen, nitrates, nitrites, sulphates, iron and poisonous metals are not concerned in the change. Albuminoid nitrogen and oxygen absorbed may have some relation to it. There is a definite relationship with the plankton found in the water. Blue-green algae appear in the plankton in the declining phase of *A. culicifacies*, amorphous organic matter and more especially the total plankton which show a progressive increase in the pits are nearly always associated with a decline in larval density. Whether these changes cause the reduction has not been proved. If so the reduction must be due to an effect on the egg laying female; the development of larvae is not adversely affected.

V B Wigglesworth

SOEDARSONO Twee gevallen van aangeboren malaria. [Two Cases of Congenital Malaria].—*Geneesk Tijdschr v Nederl-Indië* 1941 Dec. 9 Vol. 81 No 49 pp 2656-2657

In both of these cases of malaria in new born children the mothers had suffered from tertian malaria at or shortly before parturition. Both infants were under weight at birth and sickened almost immediately. Blood examination showed in the one case on the 8th day mature malaria parasites with no ring forms and in the other both adult schizonts and rings. The first infant died and the history of the second was as follows —

The mother a 9para was delivered at term of a female child, 2.8 kgm. weight and 49 cm in length. It cried vigorously, urinated and

defaecated normally. On the following day it was restless, cried much, had no fever but blood films showed the presence of malaria parasites. A blood film of the mother on the day of admission had already shown malaria parasites. She had also had a malaria attack in the 8th month of pregnancy. The malaria of the infant was quickly cured with tannate of quinine.

It seems certain that these were cases of congenital malaria contracted *in utero*.

W. F. Harvey

COATNEY (G. Robert) & YOUNG (Martin D.) A Study of the Paroxysms resulting from Induced Infections of *Plasmodium vivax*.—*Amer. J. Hyg.* 1942. Jan. Vol. 35 No. 1 pp. 138-141. With 2 figs.

The observations described were undertaken to obtain measurements of the different phases in paroxysms resulting from induced infections of *P. vivax* in white male paretics. Data were collected on 338 paroxysms in 21 patients. All temperature readings were taken rectally at four-hour intervals when the temperature was above 100°F the temperature was taken every hour. Chills, actual shaking, occurred in 59 per cent of the paroxysms. The temperature averaged 100.6°F at the start of the chill the average length of the chill was 39 minutes, and the average rise of temperature during the chill was 2.3°F. The average measurements of the 338 paroxysms were 3 hours 52 minutes from onset of fever (100°F) to fever-peak, 6 hours 18 minutes from fever peak to end of fever, height of fever-peak 104.8°F. The maximal temperatures registered were on the average 0.7°F higher in paroxysms with chills than in those without this difference was statistically significant 6.2σ. The average duration of fever was 2 hours 2 minutes shorter in paroxysms with chills. The average rate of fever rise was 3.3 times faster during the chill than during any other period of the attack. the temperature rose 1°F in 17 minutes during the chill.

Norman White

SWARTZWELDER (John Clyde) & ADAMS (Charles Carroll) Studies on the Protein Tyrosine Reaction as a Diagnostic Test for Malaria.—*Amer. J. Trop. Med.* 1941. Nov. Vol. 21 No. 6 pp. 717-723.

The protein tyrosine reaction for the quantitative estimation of blood euglobulins, as a biochemical diagnostic test for malaria, was introduced by PROSKE and WATSON [this *Bulletin* 1939 Vol. 36 p. 813]. The authors of the paper under consideration have introduced certain modifications into the technique of the reaction. Proske and Watson used a dilution of 1:30 0.1 cc. of serum in 3 cc. of sodium sulphate the authors use a dilution of 1:10 0.5 cc. of serum in 3 cc. of 15.4 per cent sodium sulphate. The dilution is important as it determines the amount of euglobulin precipitated from the serum. The authors use a colorimeter to read the tyrosine indices. A detailed description of the technique of the reaction is contained in the paper.

Normal standards were obtained from the examination of 83 normal sera. The tyrosine indices were above normal in six of nine patients suffering from *P. falciparum* malaria, in three of four patients suffering from *P. vivax* malaria, and in all of three patients with *P. malariae* infections. The tyrosine indices of six patients with paretics were very high, though they were free from malaria infection. In nine of 12 patients suffering from tuberculosis the indices were above normal.

High indices well above normal were obtained in seven out of eight cases of leprosy the disease was arrested in the only patient with a normal index. The index was above normal in three of four patients suffering from typhoid fever in two cases of granuloma inguinale [ulcerating granuloma of the pudenda] and in one case of lympho-granuloma inguinale.

The clinical value of the protein tyrosine reaction in the diagnosis of malaria is little more than supplemental. *Norman White*

WINCKEL (Ch. W F) Are the Experimental Data of Therapeutic Malaria Applicable to Conditions obtaining in Nature?—*Amer J Trop Med* 1941 Nov Vol 21 No 6 pp 789-794 [10 refs.]

With regard to the divergent opinions that have been expressed regarding the value of observations on patients undergoing malaria therapy to malariology the author summarizes an interesting discussion as follows —

As a general rule experience with induced malaria in parotics may be applied to ordinary malarial patients, provided one keeps the following points in mind

(a) If parotics are infected by mosquito bite their reaction to drugs differs from that in ordinary patients only in that the bodily resistance incited by a considerable number of fever attacks promotes the action of the drugs as a consequence somewhat smaller doses suffice and clinical relapses are fewer

(b) In treating parotics whose malaria had been induced by blood inoculation the possibility of relapses in benign tertian and quartan malaria may be ruled out altogether. Here again smaller doses than used in ordinary practice suffice *Norman White*

SCHWARTZ (Leon) FURST (William) & FLIPPIN (Harrison F) Sulfathiazole as an Antimalarial.—*Amer J Hyg* 1941 Nov Vol. 34 No 3 Sect C. pp 160-162. [11 refs.]

Nine patients undergoing malaria therapy with artificially induced *P. vivax* infections were the subjects of this study. The number of chills varied from 3 to 15 before attempts were made to terminate the malaria infections with sulphathiazole. The drug was given by mouth the initial dose was 3 gm followed four hours later by another 3 gm. thereafter 1 gm. was given every four hours. The total amount given varied from 25 to 50 gm. Chills and fever ceased in all cases. No parasites could be found in the peripheral blood after treatment in five patients one of these had a relapse 15 days later. The other four patients in this group were free from any manifestation of malaria for a period of over 90 days. The blood of four patients continued to harbour parasites they had relapses 12 13 16 and 20 days respectively after the termination of the treatment. There were no serious toxic symptoms in any case. Blood concentrations of the free drug ranged from 3 to 5 mgm per cent *Norman White*

MANFREDONIA (Mario) L'adrenalina endovena per la cura della malaria. [Intravenous Adrenalin in the Treatment of Malaria.]—*Riv di Malarologia* Sez. I 1941 Sept-Oct. Vol 20 No 5 pp 329-340 French summary

The noteworthy number of soldiers suffering from malaria invalided from Albania necessitated the establishment in September 1939 of a

convalescent home at Pozzuoli for their treatment. Most were acute primary infections. 400 of them were subjected to Ascoli's treatment associated with quinine given by mouth. The results were stated to have been most satisfactory. This lengthy paper covers no new ground but amply confirms the many favourable reports on Ascoli's treatment that have been published. *Norman White*

DREASKY (K.) Bekämpfung und Erforschung der Malaria in Petritsch (Bulgarien) [Malaria Control and Investigation in Petritsch (Bulgaria)]—*Zeitschr f Hyg u Infektionskr* 1939-40 Vol 122 pp 550-559 With 7 figs.

The chief malarial regions in Bulgaria are situated along the great rivers Danube in the north, Maritza in the centre and Struma in the south-west and in the coastal region in the east. In the Danube region the chief mosquito is *Anopheles maculipennis* (var *messensis* and *typicus*) the malaria is entirely simple tertian and the splenic index is 5 to 10 per cent. In the Black Sea coast region the mosquitoes are *A. maculipennis* (var *clutus* and *typicus*) and also *A. superpictus*. In spring the malaria is chiefly simple tertian, but in the autumn the amount of disease increases and malignant tertian is commoner so that the splenic index reaches 81 to 100 per cent. The same is true of the Struma valley. The mortality from malaria in the coastal region lies between that of the Danube and that of the Struma. These malarial regions are inhabited by about a million people of whom about 300 000 (5 per cent. of the total Bulgarian population) suffer from malaria.

As at times the mortality from malaria was greater than that from all other diseases together it was decided that something must be done to deal with the situation. The first attempts consisted of little more than the free issue of quinine and other medicaments but the good results were only limited, and eventually the Rockefeller Foundation decided to establish an antimalaria station at Petritsch on the Struma in south-west Bulgaria. The place was heavily infected, the spleen index was 90 to 85 per cent., the parasite index 60 to 65 per cent and there were everywhere numerous breeding places of *Anopheles maculipennis* and *A. superpictus*. Of the 12 surrounding settlements 10 (protected villages) were selected for total destruction of breeding places by means of spraying with Paris green etc. In the remaining two (control villages) an attempt was made to control the disease simply by quinine. Every year the results were examined by mass investigation of the number of *Anopheles*, the spleen- and parasite-indices, and the frequency of new cases. The data obtained during the last 10 years are set out in a series of diagrams from which the superiority of the antilarval measures is clearly seen.

The conclusion is reached that a systematic anti-mosquito-larva campaign by draining, and destruction of the breeding places by Paris green and street cleaning affords an extremely effective and at the same time cheap method of rendering healthy a heavily infected region. The campaign was attended by a great decrease in the number of *Anopheles* in dwellings and stables, by a striking fall in spleen and parasite-indices, and by a great diminution in the number of new cases. *H. York*

LYOVSKY (I L.) [Chlorophenol as a Larvicide].—*Trans Kuibyshev Milit Med Acad Red Army* 1940 Vol 4 pp 283-287
[In Russian]

Having first established by laboratory experiments the larvicidal properties of chlorophenol especially when mixed with petroleum the author tested the mixture under natural conditions, in a pond and river. The dosage sufficient to kill mosquito larvae and pupae in from two to four hours was 30-40 cc. of a 10 per cent mixture of chlorophenol with petroleum per 1 sq metre of the surface. This mixture proved to be more effective than petroleum alone when used as control. Chlorophenol also has the advantage of being cheap and easy to store.

C A Hoare

RUSSELL (Paul F) Some Social Obstacles to Malaria Control.—*Indian Med Gaz* 1941 Nov Vol 76 No 11 pp 681-690
[10 refs]

Progress in malaria control has not kept pace with the acquisition of knowledge as to how malaria can be controlled. The author in a long and useful paper discusses some social reasons for the perpetuation of malaria as a public health problem of primary importance. The paper does not lend itself to adequate summary in small space.

The author discusses obstacles to progress under the following heads —

(1) Absence of a sufficient weight of public opinion which has been enlightened regarding (a) economic and public health importance of malaria (b) available measures of malaria prophylaxis and control (c) social responsibility for prevention of malaria.

(2) Lack of sound administrative principles especially as regards (a) co-ordination of and effective distinction between hygiene and preventive care on the one hand and preventive medicine and medical-surgical care on the other (b) methods of obtaining effective co-operation between such governmental departments as public works agriculture and public health (c) necessity for continuity of effort when dealing with malaria.

(3) Lack of adequate training of health officers in practical malaria control methods and lack of sufficient numbers of specialist personnel such as malariologists malaria entomologists engineers and agronomists.

(4) Lack of official cognizance of economic considerations as to (a) what malaria actually costs a community (b) what benefits the control of malaria would confer on a community (c) what constitutes a proper budget item for malaria control.

(5) Inadequate knowledge of methods for applying practically that is effectively and economically the results of research in malarology.

[There is a familiar ring about many of these complaints they have served as texts for sermons by many health officials in many lands. This does not imply that the present paper is redundant. The author preaches well and with authority. May he have a large and responsive audience.]

Norman White

BOSE (P N) Anti Malarial Operations In India.—*Indian Med Gaz* 1941 Nov Vol 76 No 11 pp 690-695

The author made a study tour visiting Assam Madras Ceylon Mysore and Delhi where he obtained much information regarding

anti-malaria work in progress. His observations are condensed in a readable report. All, or nearly all the work he describes has been published elsewhere.
Norman White

Hess (A. D.) & TARIWELL (Clarence M.) The Feeding Habits of *Gambusia affinis affinis* with Special Reference to the Malaria Mosquito, *Anopheles quadrimaculatus*.—*Amer Jl Hyg* 1942. Jan. Vol. 35 No 1 pp 142-151 With 2 figs. & 2 graphs.

These investigations were carried out in the Wheeler Reservoir in the Tennessee Valley where *Gambusia* rapidly became abundant. The forage ratio was used as a measure of the feeding preference of *Gambusia* for anopheline larvae and pupae this is obtained by dividing the percentage of a given kind of organism in the stomachs by its percentage in the environment. A forage ratio of 1 indicates that an organism is being taken at random above 1 that it is being selected in preference to or is more readily available than other organisms. The studies were made in a barrier seine to insure that the fish had fed in the plot from which samples of food organisms were collected, in three types of area representing different ecological conditions. The size of the forage ratio for both anopheline and culicine larvae and pupae was directly correlated with their population densities when present in equal numbers the preference was for culicines. As densities of larvae and pupae increased the number of *Gambusia* eating them, and the number eaten per fish, both increased. The forage density for *Anopheles* was 1 when the larval density was about 2 per square foot of water surface below this it decreased above this it increased, reaching 14 when the larval density was 17 per square foot. Large female *Gambusia* eat less plankton and more macroscopic food than do small females and males of all sizes they are therefore the most effective predators of *Anopheles*. For all diptera *Gambusia* prefers pupae to larvae and later larval instars to early ones. Entomostraca were fed upon through necessity rather than choice. It would seem that availability rather than choice determines the menu of *Gambusia*.
Norman White

SEURAT (L. G.) Le Cyprinodon rubané et les poissons culicivores de la Tunisie [The Striped Cyprinodon and Larvivorous Fish of Tunisia].—*Arch Inst Pasteur de Tunis*, 1941 Dec. Vol 30 No 3-4 pp 245-263. [Bibliography]

MORRISON (Dempie B.) & ANDERSON (W. A. D.) On the Role of Parasite Pigment in the Malaria Paroxysm.—*Public Health Rep* 1942 Jan 30 Vol 57 No 5 pp 161-174 With 6 figs. [14 refs]

Certain experiments on dogs having shown that intravenous injections of solutions of disodium ferrihaemate (alkaline haematin) are followed by symptoms of toxicity (elevations of temperature however not being one of them) the suggestion was made that the symptoms of a malarial paroxysm might be due to the pigment liberated by sporulating parasites. To test this view injections of ferrihaemate were carried out on monkeys and the resulting symptoms were compared with those of malaria due to infection with *Plasmodium knowlesi*. It was noted that little if any ferrihaemate in soluble form

occurred in the blood of malaria-infected monkeys the ferrihaemate within the parasite at sporulation being rapidly phagocyted by the reticulo-endothelial system. Ferrihaemate-injected monkeys die in shock with symptoms indicative of capillary blockage in vital organs or recover very rapidly and completely after a brief period of acute toxic reaction. The conclusion is that ferrihaemate is not a causative agent in the malarial paroxysm of monkeys since the pigment is not liberated in soluble form from the parasites. C M Wenyon

Vezzoso (Bartolomeo) L'immunità passiva nell'infezione da *Plasmodium gallinaceum*. Nota seconda [Passive Immunity in *P. gallinaceum* Infection].—*Riv di Malariaologia* Sez I 1941 July-Aug Vol. 20 No 4 pp 238-250 With 5 graphs. English summary

In an earlier publication the author recorded experiments which showed that the serum of fowls which had recovered some months before from a *Plasmodium gallinaceum* infection did not produce any passive immunity to infection with this parasite when injected into healthy fowls. In a further series of experiments described in the present paper the author shows that the serum of fowls which had recovered only a short time (10-50 days) before the serum was taken was able to confer some immunity. This was evidenced by the longer incubation period, the shorter period during which parasites are present in the blood and the more rapid disappearance of the clinical manifestations of infection. To obtain the best results it is necessary to administer relatively large doses of the serum (20-25 cc. per kilo of body weight) and to continue the administration throughout the infection.

C M Wenyon

TRYPANOSOMIASIS

ZSCHUCKE (Johannes) Ueber Kernhinterendformen bei westafrikanischen Stämmen des *Trypanosoma gambiense*. [Posterior Nuclear Forms in West African Strains of *T. gambiense*].—*Ztschr f Hyg u Infektionskr* 1939-40 Vol 122. pp 620-625

The problem of the identity of *T. gambiense* and *T. rhodense* is bound up with the question whether the appearance of posterior nuclear forms in the blood of inoculated rodents is specific for the latter parasite. Although posterior nuclear forms have already been demonstrated in *T. gambiense* by KLEINE LESTER and others there is as yet no general agreement on the subject. However the present observations made by the author in Fernando Po throw more light on the matter.

The sleeping sickness focus in Fernando Po is of considerable antiquity and history shows that the disease was introduced into the island with the slave trade before 1815. Since that time new human beings have been constantly deposited in the island amidst the old focus of disease. Presumably the natives would exhibit differences in natural immunity and this theory agrees with the fact that although the disease in Europeans runs the same course it differs greatly in the coloured races.

The author points out that in 1929 and 1930 he had infected mice and guinea-pigs with Fernando Po strains but had not succeeded in

finding posterior-nuclear forms of the trypanosome. In the present investigation made 10 years later he examined strains obtained from 10 acute cases of sleeping sickness (native and European). The parasites were inoculated intracerebrally intraperitoneally subcutaneously and intravenously into white mice or guinea-pigs. Posterior-nuclear forms were found in 6 of these 10 strains—five times in mice and three times in guinea-pigs. They appeared in only one or at most two of the inoculated animals and only in small numbers, never more than 1 per cent of the total forms. In mice they were found only after intracerebral inoculation or after intravenous inoculation in animals which had received an intracerebral injection of 2 per cent starch solution. In guinea-pigs posterior nuclear forms were found after subcutaneous and intraperitoneal inoculation. Most of the animals showing posterior nuclear forms exhibited a shorter incubation period, but the length of life was usually longer and consequently it is possible some of the other animals would have shown posterior nuclear forms had they lived longer. The results of this work are summarized in a table.

The general conclusion reached is that things have changed in Fernando Po during the last 10 years. The trypanosome has become more virulent and it has begun to exhibit posterior-nuclear forms in subinoculated animals. These facts are to be related to the continual introduction of completely susceptible natives into the island and furnish additional evidence of the identity of *T. gambiense* and *T. rhodesiense*.
W. Yorke

STAPLES (R. R.) Anti-Tsetse Clearing and Land Use.—*East African Agric. J.* 1941 Vol. 7 No. 1 pp. 48-50 [10 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B 1942 May Vol. 30 Pt. 5 p. 75.]

It has frequently been assumed that clearing land of its bush and tree growth as a means of controlling tsetse flies (*Glossina*) as has been largely done in Tanganyika Territory encourages soil erosion and decreases soil fertility and water supply. In this paper it is pointed out that on the contrary under the semi-arid conditions of eastern Africa bush clearing decreases erosion, which is particularly bad in wooded grazing areas because the ground vegetation is thin and annual and numerous footpaths are formed on account of obstructions. Grass ley may be as good as or even better than bush ley in restoring soil fertility after cultivation and clearing undoubtedly improves the carrying capacity of the land, while there is reason to expect its effects on water supply to be beneficial. It is concluded that bush clearing is not only an effective anti-tsetse measure but is also probably essential to the full use of the land for mixed farming.

[See also LEWIS below p. 653.]

VON BULOW (T.) Tripanosomiasis Americana (Enfermedad de Chagas). Primeros casos en Costa Rica. [Chagas's Disease. First Cases reported in Costa Rica.]—*Rev. Medica* San José. 1941 June. Year 7 Vol. 4 No. 86 pp. 497-520 With 6 figs. [11 refs.]

The author reports two cases, one in a boy of 13 the other in a boy of two years of age. They were straightforward cases, showing the usual

signs of palpebral oedema dacryoadenitis and glandular enlargement and the trypanosome present in the blood. The reason for recording the cases is that none has hitherto been seen in Costa Rica. The local transmitter is *Triatoma dimidiata*. A spot map shows the present known distribution of the insect on the peninsula of Nicoya and the adjacent part of Puntarenas. H H S

CULBERTSON (James T.) & KESSLER (Walter R.) Age Resistance of Mice to *Trypanosoma cruzi*.—*Jl Parasitology* 1942. Apr Vol 28 No 2 pp 155-158

It is well known that *Trypanosoma cruzi* causes a more severe infection in young persons and animals than in older individuals. The present paper describes an attempt to fix this age for mice by studying carefully the relative susceptibility of mice of different known age groups. The following is the summary. —

Mice below 25 days of age when infected generally succumb to *Trypanosoma cruzi* administered intraperitoneally whereas mice above this age usually survive the infection. The infections in young animals develop after a shorter prepatent period and attain greater intensity than those in older animals.

Mice below 9 days of age can regularly be infected with *Trypanosoma cruzi* administered by mouth and those from 9 to 16 days old often prove susceptible. Mice 20 days old or more resist the parasite given orally. Infections resulting from oral administration of *Trypanosoma cruzi* are generally less intense and less frequently fatal than infections following the intraperitoneal administration of the parasite.

H Yorke

LEISHMANIASIS

ADLER (S.) Diagnosis of Kala-Azar [Correspondence].—*Trans Roy Soc Trop Med & Hyg* 1942. Mar 6 Vol. 35 No 5 p 290

In this note Adler points out that if the diagnosis of kala azar in the Mediterranean area rested on examination of smears from spleen liver sternum and gland puncture alone a small but important number of cases would be missed because parasites are rare in the viscera. Some of these cases may be severe. They can readily be diagnosed however by sowing the juice of any punctured organ on several tubes of suitable medium and this procedure should be adopted as a routine. C W

MARTÍNEZ NIOCHET (Arminio) & PONS (Adolfo R.) Primer caso de kala azar en Venezuela. [First Case of Kala Azar in Venezuela].—*Gac Med de Caracas* 1941. Sept 15 & 30 Vol 48 Nos 17 & 18 pp 329-332

The paper describes the first autochthonous case of kala azar to be met with in Venezuela. The patient was a man 28 years of age in the State of Guárico. The diagnosis was made by the discovery of leishmania in smears of the liver spleen bone marrow and skin.

C M Wenyon

MARTINS (A. Frância) Do diagnóstico sorológico das leishmanioses. [Serological Diagnosis of the Leishmaniasis.]—*Arquivos de Hig. e Saúde Pública*. São Paulo. 1940 May Vol. 5 No 9 pp. 33-44 [24 refs.] English summary (8 lines)

The author discusses the various serological reactions which have been employed for the diagnosis of kala azar. He notes that few attempts have been made to apply these to the diagnosis of mucocutaneous leishmaniasis and expresses the opinion that the tests are not yet of sufficient accuracy to permit of their practical use.

C. M. Wrayon

ROIG Y RAVESTÓS (J.) Reflexiones clinicas suscitadas por tres casos de kala-azar infantil y pectia. [Three Cases of Infantile Kala Azar with Pyetia.]—*Rev. Clin. Española* 1941 Dec. 1 Vol. 3 No 6 pp. 533-537

In describing three cases of infantile kala azar in Spain the author notes that in all three the diagnosis was obscured by a concurrent pyetia. It was only after some delay and a failure to respond to treatment that some other condition was suspected and a correct diagnosis of kala azar made by puncture of the spleen. Treatment led to recovery in two of the cases but the third patient died. The author discusses the distribution of kala azar and emphasizes the importance of early diagnosis as the fatal cases are mostly the result of delay in arrival at a correct opinion as to the nature of the illness.

C. M. Wrayon

1. TOBIAS (R. L.) Recent Experiences on a Series of Twenty Cases of Kala Azar.—*East African Med. J.* 1942 Feb. Vol. 18. No 11 pp. 336-340

2. ——— Two Cases of Severe Agranulocytosis following on Kala Azar.—*Ibid.* pp. 341-344

1. In the first of these papers the author describes the clinical features of 20 cases of kala azar in ascaris who had been stationed in Western Abyssinia. The cases were divisible into two main types—acute and subacute—but not infrequently cases of one type might change in character and come to resemble those of the other type. The majority of the cases were submitted to diagnostic puncture of the spleen, sternum and lymphatic glands. In no case were leishmania discovered in material from gland puncture. They were seen in only one of 12 as a result of sternal puncture and in 8 of 17 submitted to spleen puncture. In one case a culture of leishmania was obtained from the peripheral blood.

2. In the second paper two cases of kala azar in middle-aged African soldiers who had been in Western Abyssinia are described. Both cases were progressing favourably when they developed a severe degree of agranulocytosis. One case was treated with pentide and blood transfusion and the other with pentide and adrenalin. In both cases death followed a sudden collapse.

C. M. Wrayon

KIRK (R.) Studies in Leishmaniasis in the Anglo-Egyptian Sudan. V—Cutaneous and Mucocutaneous Leishmaniasis.—*Trans Roy Soc Trop Med & Hyg* 1942. Mar 6 Vol. 35 No 5 pp 257-270 With 4 figs. on 2 plates [31 refs.]

In this interesting paper the author discusses the relationship to one another of the various types of leishmania infection which are met with in the Anglo-Egyptian Sudan. The problem is a difficult one, for there is no marked distributional separation of purely cutaneous cases of oriental sore and undoubted ones of visceral leishmaniasis or kala azar. Furthermore cutaneous ulcers resembling oriental sore not infrequently complicate kala azar while oral leishmaniasis regarded hitherto as an instance of S American espundia may be associated with visceral infection. All these types may occur side by side in the same district while as in India, cutaneous lesions of various non-ulcerating types may occur after treatment for kala azar. It is evident that there is considerable difficulty in deciding whether an ulcer of the skin in which leishmania can be demonstrated is oriental sore or a cutaneous complication of kala azar. As far as the Sudan is concerned the author limits a diagnosis of oriental sore to those cases which remain afebrile and in which no evidence of visceral or oral infection can be made out. The purely cutaneous infections are of two types—ulcerating oriental sore and non ulcerating nodules while the cutaneous lesions which occur in the course of generalized infections may be ulcerating lesions in untreated cases or non ulcerating lesions following successful treatment of the visceral infection. In his discussion the author illustrates his remarks by short descriptions of cases and makes reference to previous papers in which he has dealt with one or other aspect of the subject under consideration. The paper is a very thoughtful attempt to clarify the difficult problem of leishmaniasis in the Sudan. It is worthy of very careful study.

C M Wenyon

HRAD (Otto) Zur Kenntnis der Orientbeule [Oriental Sore].—*Med Klin* 1942. Feb 20 Vol. 38 No 8 pp 178-180 With 3 figs

The case recorded is that of a woman who contracted oriental sore as a child in Turkestan. A nodular lesion developed over the right malar bone and persisted without increase in size for 11 years when she was seen by the author in Rumania. Small nodules had developed in the neighbourhood of the primary lesion producing an appearance of lupus. Leishmania were discovered after prolonged search and a cure was brought about by electrocoagulation therapy.

C M Wenyon

PESSÔA (S B) & PESTANA (Bruno Rangel) Lesões iniciais na leishmaniose tegumentar americana. [Initial Lesions in American Cutaneous Leishmaniasis].—*Arquivos de Hig e Saúde Pública* São Paulo 1940 May Vol 5 No 9 pp 15-20 With 2 figs on 1 plate English summary (6 lines)

The author describes four cases in which lesions on the skin or lips are regarded as the primary or initial changes in leishmania infections. These have the form of papular or erythematous elevations of the skin or impetiginous foci or fissures on the lips. In one case scrapings from a cutaneous lesion with still intact skin revealed very large numbers of leishmania. In the other cases the parasites were much fewer.

C M Wenyon

PESSÔA (S. B.) & PESTANA (Bruno R.) Infecção natural do *Phlebotomus migonei* por formas em leptomonas, provavelmente da *Leishmania brasiliensis*. [Natural Infection of *P. migonei* by Leptomonad Forms, probably of *L. brasiliensis*].—*Arquivos de Hig e Saúde Pública* São Paulo. 1940 Sept Vol. 5 No. 10 pp. 45-49 With 2 figs. on 1 plate English summary

— & COUTINHO (J. O.) Infecção natural do *Phlebotomus pessoai* por formas em leptomonas, provavelmente da *Leishmania brasiliensis*. [Natural Infection of *P. pessoai* by Leptomonad Forms, probably of *L. brasiliensis*.]—*Ibid* 1941 May Vol. 6 No. 12 pp. 15-20 With 4 figs. on 1 plate. English summary (5 lines)

COUTINHO (J. O.) Localização de formas em leptomonas, possivelmente de *Leishmania brasiliensis* no farnge do *Phlebotomus pessoai* naturalmente infectado. [Leptomonad Forms possibly of *L. brasiliensis* in the Pharynx of Naturally Infected *P. pessoai*].—*Ibid* pp. 23-29 With 3 figs. (1 coloured) on 2 plates. English summary (6 lines)

These papers record the results of the examination of sandflies for possible leishmania infection in a locality (Alta Paulista) of Brazil where cutaneous leishmaniasis is endemic.

In the first paper an account is given of the examination by serial section of 1,340 specimens (*Phlebotomus migonei* 910 *P. whitmanni* 320 *P. pessoai* 110). Two specimens of *P. migonei* were found to have a leptomonad infection of the anterior part of the alimentary tract. The flagellates are identified as evolution forms of *Leishmania brasiliensis*.

In the second paper are described further examinations of sandflies in the same or neighbouring localities. In this case dissections alone were carried out and smears made. The result was that two specimens of *P. pessoai* were found infected. The illustrations show undoubted leptomonads.

In the third paper an account is given of the examination by serial section of 164 specimens of *P. pessoai* and 113 of *P. whitmanni*. A leptomonad infection of one *P. pessoai* was discovered. Illustrations show the flagellates in the pharynx of the fly. C. V. Wenyon

VILLELA (F.) PESTANA (Bruno R.) & PESSÔA (S. B.) Presença da *Leishmania brasiliensis* na mucosa nasal sem lesão aparente, em casos recentes de leishmaniose cutânea. *L. brasiliensis* in Apparently Intact Nasal Mucosa in Cases of Cutaneous Leishmaniasis. — *Arquivos de Hig e Saúde Pública* São Paulo 1940 May Vol. 5 No. 9 pp. 23-30 With 1 fig. English summary (10 lines)

In twelve cases of cutaneous leishmaniasis the authors have made a careful examination of the nasal mucosa, though there was no indication that this was involved. In five of the cases lesions were discovered which in some cases were only detectable on magnification. In the other cases the mucosa appeared to be normal. Scrapings were made from the mucosa of these seven cases and in four leishmania were discovered. The conclusion is that in the treatment of cases of tegumentary leishmaniasis it is necessary to employ eparseño as well as

antumoniais as this is the only drug which acts upon leishmania infection of mucous membranes. [Eparsono is an arsphenamine solution ready for injection See this *Bulletin* 1940 Vol 37 p 353]

C M Wemyss

COUTINHO (J O) & BARRETO (Mauro Pereira) Contribuição para o conhecimento dos flebotomos de São Paulo I—*Phlebotomus fischeri* Pinto 1926 e *Phlebotomus pessoai* n. sp. (Diptera Psychodidae) [*Phlebotomus* of São Paulo *P. fischeri* and *P. pessoai*]—*Arquivos de Hig e Saúde Pública* São Paulo 1941 May Vol 6 No 12. pp 33-48 With 29 figs [12 refs.] English summary (8 lines)

GALVÃO (A L. Ayroza) & COUTINHO (J O) Contribuição ao estudo dos flebotomos de São Paulo Dipt. 1a Nota [*Phlebotomus* of São Paulo]—*Arquivos de Hig e Saúde Pública* São Paulo 1941 May Vol 6 No 12. pp 51-65 With 22 figs & 2 plates. [11 refs.] English summary

BARRETO (Mauro Pereira) Observações sobre a biologia do *Phlebotomus intermedius* Lutz e Neiva, 1912 (Diptera, Psychodidae) em condições experimentais. [The Biology of *P. intermedius*]—*Arquivos de Hig e Saúde Pública* São Paulo 1941 May Vol 6 No 12. pp 107-119 With 4 figs. on 2 plates. [12 refs.] English summary (5 lines)

BARRETO (Mauro Pereira) Observações sobre a biologia do *Phlebotomus whitmani* Antunes e Coutinho 1839 (Diptera, Psychodidae) em condições experimentais. [The Biology of *P. whitmani*]—*Arquivos de Hig e Saúde Pública* São Paulo 1941 May Vol 6 No 12. pp 123-131 English summary

TYPHUS

PUBLIC HEALTH REPORTS 1942. Mar 20 Vol. 57 No 12. pp 442-444 —Typhus Fever

In this collection of reports from foreign countries it is noted that at the end of January 1942 typhus was spreading in Algeria with great rapidity. The numbers of cases had recently trebled in the Departments of Algeria and Oran while in that of Constantine they had increased sixfold. From January 1st to 20th 1942 there were 2146 cases. It is reported that injections of serum have shown good results [the serum referred to may have been that described by DURAND and BALOZET this *Bulletin* 1942 Vol 39 p 543]

In Morocco 793 cases were reported in one week in February 1942 and in Spain there were 638 in the four weeks to 24th January. In Tunisia 888 cases were reported in two weeks in January and February 1942.

All these figures are higher than in preceding periods and it is evident that in North Africa there has been a serious spread of this disease

C W

SEIFERT (Gustav) Ein Index für Fleckfieberverseuchung [An Index of Typhus Infection.]—*Muench Med Woch* 1942. Apr 3 Vol 89 No 14 pp 304-306

The name typhus infection index is proposed as a designation for the percentage of the people of a community who react to *Proteus O 119* in titres of 1-100 and over. Lower titres are sometimes found in convalescents for months but anything in excess of 1-100 can be regarded as evidence of an inapparent attack or of the person's being a carrier of

infective Rickettsiae. The "loupe-index" is also carefully estimated and taken into account in determining what measures of control are needed.

At least 50 persons should be examined if possible—children are the best subjects for the survey because they frequently suffer from attacks which are easily missed. The titre of 1-100 has been selected but all persons who give a clearly positive reaction in this titre are tested again to find the end-point.

The index was found to be zero in 100 German soldiers, also in 100 Russian prisoners of war who had been quarantined for long periods and repeatedly deloused. 10 persons in the latter group gave histories of previous attacks of typhus fever. In another group of 100 Russian prisoners who had been quarantined for a shorter period the index was 16. Investigation of the other prisoners belonging to the same camp revealed the existence of two cases of typhus and in the following days 25 cases of the disease occurred. Most of these cases were mild and would hardly have been recognized if the survey had not been made. The 16 persons who reacted showed no signs of disease although eight of them reacted in titres of 1-400 to 1-1 600 and so must either have been suffering from abortive attacks or have had previous attacks which rendered them immune from the disease but did not prevent the lighting up of the agglutinins in response to a fresh invasion by Rickettsiae.

John W. D. Megaw

WALTHER (G.) Das klinische Bild des Fleckfiebers [The Clinical Features of Typhus Fever]—*Munch Med Woch* 1942, Apr 3 Vol. 89 No 14 pp 289-304 [35 refs.]

This paper was written by special request—it gives a detailed and fully documented account of the clinical aspects of typhus fever. It contains little that is new but in view of the special interest of the disease at the present time the following points may be worth noting. *Rickettsia prowazekii* remains virulent for months in the dried faeces of lice—infection through the respiratory or conjunctival routes is therefore possible and cases have been reported of infection by inhalation. The virus is killed by heat at 45°C and by 0.5 per cent carbolic in 30 minutes. Corrosive sublimate 1-6 400 is also effective. One cmm of blood from the 7th till the 12th day of the disease contains about 100 000 Rickettsiae so that care must be taken when blood samples are being collected.

The Weil-Felix reaction to *Proteus OX19* in titres of 1-160 and over is regarded as diagnostic—this occurs in nearly 100 per cent. of cases by the 6th day. A bacillary suspension of *Proteus OX19* with added alcohol keeps for several years and obviates the need for fresh cultures. Kudicke and Steuer's dry-blood method is useful in field work so is Brumpt's reaction which needs only a small drop of blood mixed with a suspension of *Proteus OX19* stained with methylene blue. In positive cases the drop of the mixture placed on a glass slide soon shows at the margin a blue ring consisting of stained bacilli—inside this is a zone which is hardly coloured. In negative cases the preparation is uniformly stained.

An agglutination reaction in which Rickettsiae are used has the advantage of being truly specific—it does not give positive reactions, such as are seen with the Weil-Felix test in cases of jaundice undulant fever and even in some cases of typhoid fever.

Infective lice have been recovered from patients up to 24 days after the end of the fever. Inapparent cases especially in children and virus carriers must be taken into account.

Protective vaccination is discussed but delousing is regarded as being still the essential method of preventing and controlling epidemics.

John W D Megaw

LIU (Wei Tung) ZIA (S H) CHUNG (H L) & WANG (C W) Typhus Fever in Peiping. Epidemiological Considerations.—*Amer J Hyg* 1942. Mar Vol 35 No 2 pp 231-250 With 1 map & 1 fig [38 refs]

Three of the authors Liu Zia and Chung have already published several reports in which they have discussed the intriguing problem of the relationship between louse-borne and flea borne typhus fever. Their previous arguments are repeated in this paper and a certain amount of additional evidence is brought forward in support of the view that flea borne and louse borne typhus fevers coexist in Peiping and that there as in Mexico epidemics may originate from rodent reservoirs. It is stated that further investigation is needed to determine whether all epidemics arise from rodent reservoirs or whether some epidemics may start from cases of inapparent infection or from human carriers.

Altogether 491 cases of typhus were treated in the Peiping Union Medical College Hospital from 1921 to 1940 of these about 60 per cent were certainly or possibly acquired by louse-borne infection the rest were in relatively cleanly persons and in the majority of them no association with lice or with previous cases was reported. In six instances of apparently isolated endemic attacks cases of the disease had been reported from the same premises several months or years previously. Most if not all, the residences in Peiping are infested with rats or mice or both. The seasonal incidence corresponds fairly closely with that of relapsing fever except that there is a definite slight rise in the number of cases of typhus in the late summer and autumn. This is believed to be due to the occurrence of cases of murine typhus. There were five proved cases of murine typhus. In one outbreak in a house and two in institutions typhus strains were isolated from rats, mice and fleas. Louse strains were also isolated which showed some of the characters of murine virus.

These appear to be the chief findings on which the authors base the view stated in the second sentence of this abstract.

An interesting table is given showing the incidence of various acute infectious and parasitic diseases among patients admitted to the hospital from July 1921 to June 1940. The figures are —

Bacillary dysentery	2,549	Epidemic meningitis	205
Scarlet fever	937	Paratyphoid fevers	201
Kala azar	888	Epidemic encephalitis	178
Lobar pneumonia	822	Tetanus	119
Diphtheria	804	Whooping Cough	76
Typhoid fever	764	Acute poliomyelitis	67
Malaria	544	Cholera	65
Erysipelas	525	Smallpox	51
Typhus fever	491	Undulant fever	22
Relapsing fever	484	Rabies	21
Amoebic dysentery	351	Anthrax	13

John W D Megaw

SONI (R. L.) Typhus Fever in Burma. (With Record of Three Cases).—*Indian Med Gaz.* 1942 Feb Vol 77 No 2 pp 79-81
With 3 charts

Three isolated cases occurring in 1935 1936 and 1940 respectively are reported. The place of occurrence was presumably Rangoon in one case the diagnosis was shop typhus and the other two are apparently regarded as being of the same kind.

One patient had been engaged on an intensive rat drive within 12 days of onset no lice were found in any case and there was no history of insect bite. In two of the cases a rash appeared on the sixth day in the other no rash could be seen. The fever lasted from 13 to 17 days.

The serum reactions were —

	Widal	Weil Felix		
		<i>Proteus</i> OXK	<i>Proteus</i> OX19	<i>Proteus</i> OX2
Case 1 18th day	—	+1 34	+1 340	+1 64
Case 2, 8th day 14th day	—	-1 50	-1 50	-1 50
	T+1 600 TO+1 100	+1 30	+1 375	+1 750
Case 3 10th day	—	-1 50	+1 300	-1 50

The leucocyte count in the second case was 4 000 on the 8th day.

In one case protosol album was given but the dosage is not stated the author remarks that if the drug was responsible for the comfortable course it had no appreciable effect on the temperature but rather could be held responsible for the anaemia which developed after its use. The haemoglobin in this case fell from 80 per cent on the 6th day to 45 per cent on the 14th day.

John W D McGee

ALICATA (Joseph E.) Experimental Transmission of Endemic Typhus Fever by the Sticktight Flea, *Echidnophaga gallinacea*.—*Jl Washington Acad Sci* 1942 Vol 32 No 2 pp 57-60 [Summary taken from *Biol Abstracts*, 1942 May Vol 16 No 5 p 1196 Abstr No 12883]

The virus of endemic typhus (Wilmington strain) has been successfully transferred to sticktight fleas as a result of allowing the fleas to feed on an experimentally infected rat. An emulsion of the faeces of these fleas and an emulsion of the body of these fleas produced clinical typhus when inoculated into guinea-pigs. Clear-cut cross-immunity has been shown in guinea-pigs inoculated with the virus from the fleas and with a known endemic typhus virus (Wilmington strain). Histological examination of the brain of one of the guinea-pigs inoculated with the strain of virus recovered from the fleas revealed characteristic lesions of typhus fever. Agglutinins for *B. proteus* OX19 were demonstrated in the serum of a rabbit inoculated with the strain of virus recovered from the fleas.

MANRIQUE (Jorge Boshell) & MONTÓYA (Juan Antonio) Un nuevo foco de Fiebre Petequial del tipo de las montañas rocosas en Colombia. [A New Focus of Spotted Fever of the Rocky Mountain Type in Colombia.]-*Bol d Inst Nac de Hig Samper Martínez*. Bogotá. 1942. Jan 24 No 5 pp 21-23

Twelve cases of fever all fatal occurred within three weeks towards the end of 1941 in a non malarious locality in the southern part of the Santander province of Colombia.

Rats inoculated by the intracerebral route with the blood of one patient gave negative results, but guineapigs inoculated intraperitoneally showed distinct scrotal reactions in the second passage of the virus. Rickettsia bodies were cultivated in chick embryos. Two rhesus monkeys were inoculated both died after two days of fever the incubation period was five days. Cross immunity tests no details of which are given showed that the disease was immunologically identical with Rocky Mountain spotted fever and the spotted fever of Tobia and São Paulo.

The authors suggest that the disease probably occurs, without being recognized in many other localities in Colombia.

John W D Megaw

YELLOW FEVER.

ROCKEFELLER FOUNDATION A REVIEW FOR 1941 [FOSDICK (Raymond B)] pp 13-17 With 2 figs —Yellow Fever in 1941

Some very fruitful research has been carried out by the field staff of the Rockefeller Foundation on yellow fever during 1941 in particular jungle yellow fever. It is now over four years since *aegypti* transmitted yellow fever was recorded on the American continents but during 1941 outbreaks of the jungle form occurred in the Magdalena Valley in the plains of Colombia in the Cuyuni Valley in Venezuela, and in the Amazon Valley in Peru Bolivia and Brazil, so that reinfection of areas infested by *Aedes aegypti* is a constant menace. A species of *Haemagogus* has been known for some time to be a capable transmitter of the jungle yellow fever virus but in the dry season this mosquito could not be found although cases of the disease continued to occur. The field staff investigated this problem and solved it by discovering that this mosquito is a tree-top dweller and may be found there when none was being caught at ground level. They found the virus present in tree-top mosquitoes, and thus elucidates two important points first the way in which the virus may be carried over from one rainy season to the next and second the prevalence of jungle yellow fever among men engaged in felling trees. A second successful piece of work has been carried out in Western Uganda. Prior to 1941 blood tests had proved cases of acquired immunity in man though no actual cases had been observed. In 1941 natives in the Ituri forest were becoming immune. In other words, the virus was present there. Investigation then revealed a human case from which the virus was isolated as it was also from a prevalent mosquito *Aedes simpsoni* caught in the wild. H H S

PLAGUE.

WHEELER (C M) & DOUGLAS (J R) Transmission Studies of Sylvatic Plague.—*Proc Soc Experim Biol & Med* 1941 Vol. 47 No. 1 pp 65-68. [Summary taken from *Rev Applied Entom* Ser B 1942. Mar Vol. 30. Pt. 3 p. 33.]

In mass feeding experiments with *Ceratophyllus* (*Diamanus*) *montanus* Baker and *Hoplopyllus* *anomalous* Baker the predominant fleas on *Citellus beecheyi* in California, *C. (Malarens) telchinum* Roths from *Microtus californicus* the rat fleas, *C. (Nosopsyllus) fasciatus* Bosc, and *Xenopsylla cheopis* Roths and the cat flea *Ctenocephalides felis* Beh plague was transmitted by each species except *Ceratophyllus telchinum* and *H. anomalous* appeared to be a poor vector. The infection vector and transmission potentials of each species were then determined by individual feeding experiments on white mice. The infection potential is obtained by dividing the number of fleas that become infected (ascertained by daily faecal cultures during the life of each flea and subsequent histological examination) by the total number used, and the vector potential by dividing the number of infected fleas by the number that transmit infection. The transmission potential is the number of transmissions (infected mice) per infective flea. The product of these factors represents the number of transmissions effected by an average individual or the vector efficiency. The results are given for *Ceratophyllus montanus* and *X. cheopis* the three potentials and vector efficiency were 0.85 0.52, 2.53 and 1.14 respectively for the former and 0.88 0.29 1.44 and 0.39 for the latter. These figures show that to evaluate the efficiency of an Arthropod as the vector of an infectious agent, all three potentials must be taken into account.

STEWART (M A) & EVANS (F C.) A Comparative Study of Rodent and Burrow Flea Populations.—*Proc Soc Experim Biol & Med* 1941 Vol 47 No 1 pp 140-142. With 2 graphs [Summary taken from *Rev Applied Entom* Ser B 1942. Mar Vol. 30 Pt 3 pp. 33-34.]

An investigation was carried out in a district of California heavily populated with *Citellus beecheyi* on the correlation between flea populations on the ground squirrels and at the openings of their burrows and on the seasonal composition of these populations. Cotton batting was placed in the mouths of 30 burrows, divided into three approximately similar groups of 10 and collections were made at weekly intervals from 29th April to 23rd October 1940 from the three groups in rotation, while ground squirrels were trapped alive lightly anaesthetised and combed to remove all fleas at similar intervals over the same period. All but about a dozen of the 7,500 fleas taken were *Ceratophyllus* (*Diamanus*) *montanus* Baker or *Hoplopyllus* *anomalous* Baker. *C. montanus* was markedly predominant in the flea population from 29th April to 28th June when the mean temperature was below 75°F and *H. anomalous* from 11th July to 14th October when the mean temperature was above 75°F. No other correlation between atmospheric or burrow temperatures and flea indices was detected. The density of the flea population and its composition at the mouths of the burrows, as shown by the figures for groups of 10 openings, reflect with

a high degree of accuracy though on a smaller scale the flea indices of the host. It should, therefore, be possible by flea surveys from 10 or more burrow mouths to obtain information as to the appropriate time to begin prophylactic measures against sylvatic plague, the plague potentialities of an area based upon the species of fleas in it and presumably the presence or absence of plague infections in the flea population and the likelihood of epizootics. Although *H. anomalous* can transmit plague under experimental conditions, it is probably not so efficient a vector as *C. montanus*. It is possible that in the past areas have been recorded as free from plague infection because they were surveyed at a time when the predominant flea species were poor vectors or incapable of transmitting plague.

CHOLERA

CAMPBELL RENTON (Margaret L.) The Recovery of Cholera Vibrios after Drying — *Jl Path & Bact* 1942. Jan Vol 54 No 1 pp 121-125

The early investigations of Koch indicated that cholera vibrios were easily killed by drying. This statement has to be qualified and refers strictly to a particular mode and rate of drying. In the present experiments the desiccation of drops of 24-hour peptone water cultures was carried through rapidly over P_2O_5 *in vacuo*. The samples froze by evaporation in 4-5 minutes. When the desiccated sample was sealed into an outer tube in which a vacuum was created again over P_2O_5 it was found to be viable or rather some organisms were found still to be viable when the tubes were opened four years later. If the sealing was not perfect no recovery of organisms could be made. Although extraordinary viability is thus proved it is also shown that drying does cause death of large numbers of vibrios. Thus with a 24-hour culture and a colony count of 36 000 000 this count became at 2½ 5 and 14 minutes 9,200 000 3 600 000 and 40 000 respectively. It is interesting to find that the haemolytic factor of El Tor vibrios was still preserved after four years even in cracked tubes from which no viable vibrios could be cultivated. Recovery of viable vibrios from the desiccated material was best effected by plating out on blood or serum agar. Full tests were applied for the identification of the organisms recovered.

W F Harvey

GORDON (J) & JOHNSTONE (K I) Differentiation between Members of the Genus *Vibrio* by the Bactericidal Technique — *Jl Path & Bact* 1942. Apr Vol 54 No 2 pp 221-225

The serum of the guinea pig is bactericidal for a number of organisms and it has been suggested by the authors that this property might be utilized for antigenic differentiation. They found that after absorption with a particular organism the bactericidal power was relatively more reduced for that organism than for other species or strains. It was postulated that there must be in normal guinea pig serum either a vast number of strain-specific antibodies capable of individual absorption or a general bactericidal antibody capable of being rendered relatively inactive against a particular organism or strain by contact with a large excess of that organism. The method has here been applied to

the differentiation of vibrios. The details of the relations of amount of inoculum, susceptibility of individual strains, degree of absorption of sera and maintenance of complement titre are commented on and evidently optimum relations are not easy to establish. "It has been possible to detect antigenic differences between the true cholera strains and related vibrios and to distinguish certain strains of *V. cholerae* which differ antigenically from the main group." W. F. Hervey

BAKERJEE (D. V.) Cholera Toxin.—*Jl Indian Med Assoc* 1942. Jan. Vol. 11 No. 4 pp. 93-99 [29 refs.]

The method of obtaining the cholera toxin was that of dialysis through cellophane sacs and the use of Ramon's peptic digest of veal medium. This medium which is buffered with sodium acetate (5-10 gm./litre) contains 0.2 per cent glucose and maintains its pH with little change. Instead of having the medium both inside and outside the cellophane sac a trial was made with normal salt solution in the sac and dialysis was continued overnight. Next morning it is found that the diffuse medium, which was originally only saline, has taken a tinge of yellow colour of the Ramon's medium. Growth in the salt solution appeared to be just as luxuriant as in the nutrient medium. It was found important to use a large quantity of seed culture to obtain a satisfactory toxin. The method of preparation of toxin from the diffuse was not to filter through a candle which reduces toxicity but to centrifuge and then kill the residue of organisms in the supernatant fluid by passing a current of air containing chloroform and toluol through it. Little difference in toxicity seems to have been found, whether cultivation was aerobic or anaerobic although the anaerobic culture appeared to be more potent by intraperitoneal injection. It was found that all the animals receiving 2 c.c. of the filtrate from culture both aerobic and anaerobic died within 24 hours and nearly all died within 4 days. The minimum lethal dose is thus 1 c.c. of the filtrate. Intravenously the minimum lethal dose was 0.25 cc.

W. F. Hervey

TOXES (J. Walker) Cholera and Anuria.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942. Jan. 31 Vol. 35, No. 4 pp. 229-234 [18 refs.]

This paper contains much the same information as that already reviewed in this Bulletin, 1942, Vol. 39 p. 163.

BISROP (T. H.) Cholera and its Treatment.—*Med. Press & Circular* 1942. May 27 pp. 348-350.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

STOKES (Roy J.) & ORTIZ (Jose) Amoebiasis. Study of 100 Cases in Puerto Rico.—*Bol. Asoc. Med. de Puerto Rico* 1942. Feb. Vol. 34 No. 2 pp. 64-68 [13 refs.]

The idea appears to be prevalent that amoebiasis in Porto Rico is of relatively minor importance. It is suggested that though this

dictum might apply to amoebic dysentery it cannot in any sense apply to amoebiasis.

The authors consider that *E. histolytica* may be responsible for a considerable proportion of abdominal complaints and have observed many cases treated as gastric ulcer cholecystitis chronic appendicitis and spastic colitis which in a few days responded to arsenical therapy.

It is claimed that whilst granting that cysts in the stools do not always indicate active infestation their presence requires treatment without fail. Out of a total of 1 478 clinic records 52 positive cases were found an incidence of 3.5 per cent. Of these patients together with 48 derived from other sources 67 per cent complained of abdominal pain although only 10 per cent had acute amoebic dysentery the remaining 33 per cent complained of general symptoms—malaise headaches weakness and pallor. The great majority had abdominal pain accompanied by nausea occasionally by alternating constipation and loose stools. Pain may be referred to the epigastrium right upper lower or left quadrants and this localized pain may be accompanied by an increase of leucocytes with an average of 11,800 in the differential count the only noteworthy feature being the absence of eosinophiles.

The argument is illustrated by citation of two cases suggesting appendicitis with immediate response to carbarsone. In those cases exhibiting vegetative forms the following routine was followed.—If the stool was solid a saline purge was given and the third movement collected in a warm bedpan and examined without delay warm slides and coverslips were used.

The great majority were diagnosed on the presence of cysts—and for this purpose 5 grammes of faeces were macerated in 50 cc. of a 10 per cent copper sulphate solution and stood for eight hours. This method renders the nuclei and chromidial bodies more apparent the suspension should be of such concentration as to permit printed matter to be read through it.

Carbarsone treatment has proved entirely satisfactory. Amoebic abscess was not encountered. No surgical procedures should be undertaken on abdominal conditions until a thorough search for *E. histolytica* has been carried out.

[The proof-reading has been defective and the rendering of *histolytica* in the text has become varied and confusing.]

P. Manson Bahr

BELTRAN (Enrique) & LARENAS (Raúl). Protozoarios intestinales en una comunidad escolar de la ciudad de México. [Intestinal Protozoa of a School Community in Mexico City].—*Rev. Inst. Salubridad y Enfermedades Trop.* Mexico 1941 Sept. Vol. 2 No. 2. pp. 183-212. [12 refs.] English summary.

An examination for intestinal parasites of 410 pupils in a public boarding school in Mexico City has shown that 91 per cent. were infected with one or more intestinal protozoa. The infection rate for *Entamoeba histolytica* was 47 per cent. C. M. Wemyss

OSBURN (H. S.). Metastatic Amoebiasis in Natal.—*South African Med. J.* 1942. Feb. 28. Vol. 16. No. 4. pp. 89-90.

The author gives brief notes of eight cases of amoebic hepatitis (one patient subsequently had a pinkish, almost anchovy coloured

sputum) treated with emetine, all of which responded rapidly to the drug. All the patients complained of pain in the liver region and had adventitious signs at the lung bases, but two only showed an enlargement of the liver. Recently from the King George V Hospital for Tuberculosis Durban, seven cases of pulmonary amoebiasis have been reported and it is thought probable that a considerable number of such patients are recorded erroneously as suffering from tuberculosis of the lungs.

H H S

SILICEO AMBIA (Luis) Los abscesos hepáticos amibianos y su tratamiento por el neosalvarsán. [Treatment of Amoebic Liver Abscess with Neosalvarsan.]—*Rev Med Veracruzana* 1942. Apr 1 Vol. 22 No. 4 pp. 3635-3656

The author proposes his method for patients in whom emetine does not succeed or in whom it produces toxic symptoms. In the case he describes (and he states that he has had four such cases now) he operated, and after evacuating a large quantity of pus he introduced by a two-way cannula 500 cc. of distilled water containing 45 cgm. of neosalvarsan repeating the process the following day. Six days later fever and pain had disappeared and he was treated with liver extract and yatren, and the patient was able to leave hospital. [It seems a little misleading to call this treatment with neosalvarsan, for the patient had had emetine, was operated upon, and had subsequent yatren and liver extract in addition to the specific drug.]

H H S

HAGA (J) Liver Abscess Perforating into the Right Lung.—*Med. J. Australia* 1942 Feb 7 29th Year Vol. 1 No. 6 pp. 170-172.

BARMA (P. N. Smha) ROY (H.) & BHATTACHARYA (T) A Liver Abscess bursting into the Peritoneal Cavity with Signs of Intestinal Obstruction.—*Indian Med Gaz* 1942 Mar Vol. 77 No. 3 p. 152

KILB (Roy L.) & WELSH (A. L.) Contact Dermatitis from Emetine Hydrochloride.—*Arch. Dermat. & Syph.* 1942 Mar Vol. 45 No. 3 pp. 550-552.

In 1924 M. M. PRASHKIN recorded urticaria and itching of hands and forearms from handling emetine solution. The authors mention two patients under their care who were employed in filling ampoules with emetine hydrochloride. The fingers showed vesiculation on a basal erythema in one case and the fingers, cubital fossae and face in the other. Patch tests in both gave a faint erythema in 24 hours but in 48 hours oedema and marked vesiculation in response to emetine hydrochloride and a mild erythema to U.S.P. solution of potassium arsenite (there was less than one part in 100,000 of arsenic in the emetine hydrochloride powder which was used for making the 4 per cent solution for the ampoules). Ten persons were employed in the filling and three others of these (i.e. five altogether) had a dermatitis of the face, hands and neck. When removed from contact with the emetine all five recovered rapidly.

Attention is called to the necessity of waiting for 48 hours before expecting a marked reaction to the patch test with emetine.

H H S

HARTMAN (Howard R.) KYSER (Franklin A.) & COMFORT (Mandred W.) Infection of the Gallbladder by *Giardia Lamblia*.—*Jl Amer Med Assoc* 1942. Feb 21 Vol. 118 No 8 pp 608-609

The case reported is that of a man 32 years of age who suffered from periodic attacks of diarrhoea associated with pain in the right upper quadrant of the abdomen. A giardial infection was discovered and a course of atebryn given. This gave only temporary relief of symptoms. When seen six months later the patient had lost much weight and was still exhibiting the same symptoms. A giardial infection was again noted. A diagnosis of chronic cholecystitis was made and an operation was performed. The gall bladder appeared normal except for a slight thickening. There was oedema around the head of the pancreas, which contained an adenoma. The contents of the gall bladder were aspirated and in these giardia were discovered. No other surgical interference was carried out. The abdominal pain continued and when recovery from the operation had taken place a course of atebryn was given. The giardial infection of the duodenum as well as the symptoms, completely disappeared.

C M Wemyss

LEPROSY

BURNET (Et) Essais d'inoculation de tissus de lèpre humaine aux rongeurs. Quelle est la réceptivité du hamster? Le danger d'intrusion de la tuberculose [Inoculations of Leprous Material Into Rodents].—*Arch Inst Pasteur de Tunis* 1940 Sept Vol 29 No 2 & 3 pp 155-169

The author gives a valuable résumé of the evidence on this question. He refers to his own failure to infect more than one of 14 hamsters inoculated with human leprosy material and states that there is no clear evidence that hamsters are any more susceptible to such inoculations than other rodents [see this *Bulletin* 1939 Vol 36 p 539]. He stresses the difficulty of excluding tuberculous infections, since some types of tubercle bacilli may fail to infect guinea-pigs. It is also impossible to determine whether lepra bacilli found in inoculated tissues are living or dead and he points out that only the development of typical mass infection of lepra cells or globi can be taken to prove infection with living bacilli. The hamster is very susceptible to tuberculous infection. He concludes that we still lack any experimental animal that can at all constantly be infected with human leprosy.

L Rogers

DUBOIS (A.) & GAVRILOF (W.) Essais d'inoculation de la lèpre humaine au hamster non splénectomisé. [Inoculation of Human Leprosy Into Hamsters].—*Arch Inst Pasteur de Tunis* 1940 Sept. Vol. 29 No 2 & 3 pp 170-173

The authors report on the inoculation of 12 hamsters with leprosy nodules sent by air from the Congo and used after nine days and also four inoculated with fresh leprosy material from a local case. The results in all were negative as regards human leprosy but one animal showed infection with the Stéfansky rat leprosy bacillus the origin of

which was not traced [compare this *Bulletin* 1940 Vol. 37 p. 628]. They conclude that although their results do not invalidate occasional successes by previous workers, they do confirm the work of such observers as BURNET [this *Bulletin* 1939 Vol. 36 p. 539] in showing that experimental infection with human leprosy of hamsters which have not been splenectomized is far from being commonly successful. [See also this *Bulletin* 1938, Vol. 35 p. 293 1940 Vol. 37 p. 627]

L. Rogers

BURNET (Et.) Essais d'inoculation des bacilles lépreux B de Stepan-sky B de Hansen, sur le poutmon par instillation dans les narines. [Attempts to inoculate Leprosy Bacilli by Nasal Instillations].—*Arch. Inst. Pasteur de Tunis* 1940 Sept. Vol. 29 No 2 & 3 pp. 174-178

In attempts to find a method of experimental infection with lepra bacilli the author has tried the nasal instillation of mice and rats under anaesthesia. Stepansky's bacillus should first be used. The results showed that mice were much more receptive than rats. In the animals in which lesions were produced the acid fast bacilli were found in the tracheo-bronchial glands and also to some extent in endothelial cells in the lungs, but no nodules were present. In very few animals were the bacilli found in the spleen or liver so there was no tendency to generalization. The author therefore concludes that inoculation by the respiratory route is not the method of choice for such work.

L. Rogers

BÖNGER (Walter) Gibt es eine kongenitale Lepra? [Is there a Congenital Leprosy?].—*Klin. Woch.* 1941 Nov. 22. Vol. 20 No. 47 pp. 1169-1171

The author discusses this question in the light of his investigations in Brazil and the literature of the subject. Experience of the isolation from their birth of the children of leprosy parents throws light on the matter for in India Canon GUILFORD recorded that very few children brought up by their leper parents escaped the disease but after Canon JACKSON in the Punjab commenced separating young children from their infected parents very few developed the disease. This indicated post-natal infection from their parents as the usual mode of contamination. The theoretical possibility of congenital infection is based on lepra bacilli being occasionally found in the blood of patients especially during febrile reactions. There is also abundant pathological evidence that lepra bacilli may be present in the placenta and they have also been demonstrated in semen and in the genito-urinary organs of infected males. Whether they can pass through the placenta into the blood vessels of the child to produce intra-uterine infection, however, is very difficult to decide. In most of the cases reported as congenital infections the child was not separated from the mother soon enough to exclude the possibility of post-natal infection.

The author has been able to observe 300 infants who were separated at a very early age and kept under observation up to 13 years. In none of them did leprosy symptoms appear. Moreover he has made histological examinations of the organs of 60 infants of leprotic mothers

but was unable to demonstrate lepra bacilli in their bodies. He therefore concludes that congenital infections are so extremely rare as to be of no practical importance. Very early separation of infants from leper parents is therefore an effective preventive measure.

L Rogers

PLSCÉ (Hugo) La cutirreacción histaminica de Pierini en los leprosos del Lazareto de Lima y los de Apurímac [The Histamine Skin-Test in Lepers]—*Guatemala Méd* 1941 Sept Vol 6 No 9 pp 7-9

This test known in the Argentine as the Pierini test is performed by placing on the skin a drop of a 1:1000 solution of phosphate of histamine in double distilled water and puncturing lightly through it with an injection needle without causing effusion of blood. The author tried it on five healthy subjects and 25 lepers from the Lima Lazaretto and the Apurímac Dispensary. The reaction comprises three stages or degrees: (1) Local congestion of 1-3 mm diameter appearing in 10-80 minutes; (2) an erythematous areola of 20-30 mm. appearing in 1½-2½ hours; and (3) an oedematous papule 1-7 mm. in diameter in 2-5 hours. Even so mild a reaction as stage (1) is interpreted as positive.

The results in this small number of cases and controls were negative in all the controls and in the healthy areas of the skin of lepers; positive in all anaesthetic or maculo-anaesthetic areas of lepers (one case in which there was doubt as to the nature of the local lesion gave a positive result). The procedure is easy, as is the interpretation in most cases, and is regarded as useful in differentiating leprosy maculae or hypochromic areas from those due to vitiligo or pinta and the like and is serviceable therefore in contacts presenting dubious lesions or suspicious spots.

H H S

ALBERTO CASTRO (Carlos) Perforantes plantares [Perforating Ulcers of the Sole]—*Med y Cirugia* Bogota 1940 Oct. Vol 5 No 2 pp 82-84

Basins his views on the theoretical vasodilating action of acetylcholine, the cicatrizing action of insulin and the effect of the latter in stimulating and fixing albuminoid substances in the human body and its other actions, the author has used acetylcholine-insulin in the treatment of perforating ulcers of the foot in lepers.

His method is to give intramuscularly 1 cc. of acetylcholine (equal to 10 cgm of active substance) and on the following day 0.5 cc insulin subcutaneously (equal to 10 units). He gives 6-8 injections of each repeated after an interval of 10 days, then after each of successive rest periods of 15, 20, 25 and 30 days, then increasing the rest period by 10 days till cure is complete (so for example after the seventh series of injections there would be 40 days rest). In early cases of perforating ulcer two or three series usually suffice. In some cases the site is scraped and cauterized with 15-20 per cent silver nitrate.

He has observed even after the first course that the tissues are recovering vitality, the natural colour returns, the cyanosis disappears and the oedema is reduced together with pain, and the general state improves. Notes of four cases are given.

H H S

HELMINTHIASIS.

ACKERT (J. E.) Natural Resistance to Helminthic Infections.—*Jl Parasitology* 1942 Feb Vol 28 No. 1 pp 1-24 With 4 figs [94 refs.]

In this address the author reviews and analyses the literature on such factors in natural resistance to helminth infections as diet, genetic constitution and age, and presents some new data on an inhibitory nematode growth factor in duodenal mucus of older animals. He uses the term natural resistance to designate a host's resistance at any age to its helminths as developed in the absence of helminthic antigens. Natural immunity is interpreted as representing a natural incompatibility between the host and an invading helminth, whilst immunity is used to represent the host condition that is due to helminthic antigens.

Dietary factors in resistance to helminths

Vitamins—In 1927 the author made a survey of the intestinal helminths of 1,000 chickens in the vicinity of Manhattan, Kansas, and found that nearly half of them were infected with *Ascaridia galli*. Inquiry into the methods of rearing showed that the fowls in the garden season were usually confined to a pen in which no green food was available. The principal food of kafir or corn was inadequate and low in vitamins B and A. Previous work (1924-1927) had shown that the resistance of chickens to *Ascaridia* was affected by diets deficient in these vitamins and that natural resistance of animals to helminthic infection may be lowered by nutritional deficiencies. HIRAISHI (1926) in Japan gave pigs a vitamin A deficient diet and lowered their resistance sufficiently to parasitize them with the human *Ascaris*, and CLAPHAM (1933) working on the hatching and survival of the horse ascariid, *Parascaris equorum* in rats found vitamin A to be an important factor in resistance. He also found that this vitamin is also a factor in the resistance of chickens to *Heterakis gallinae*. WRIGHT (1935) in experiments on dogs infected with ascariids found that the animals fed on vitamin A deficient diet harboured about five times as many worms as did controls fed on adequate diet and exposed to the same degree of worm infection. MCCOY (1934) showed that vitamin A is an important factor in the reaction of rats to super-infections of *Trichinella spiralis* and LAWLER (1941) found that the absence of vitamin A lowered rats' resistance to a primary infection with *Strongyloides ratis* and weakened their immunity to reinfection with these parasites [see below p. 632].

All this work indicates that a diet markedly deficient in vitamin A will lower the resistance of the host to its nematode parasites. The explanation of this fact has, however, not yet been completely elucidated. It is known that lack of vitamin A affects the normal functioning of epithelial membranes of parts of the respiratory, digestive and uro-genital tracts, and also those of the eyes and tear ducts. Whether the lining of the small intestine, which is the habitat of most of the adult nematodes studied, is affected, will require further investigation.

The work of VINCENT and ACKERT (1926) showed that vitamin B deficiency lowered the resistance of the fowl to *Ascaridia*, and later

work by ACKERT and NOFF (1931) showed that lack of vitamin B which caused paralysis of the muscles of the digestive tract resulted in the retention of a high percentage of *Ascaridia* whereas the control chickens eliminated most of them. FOSTER and CORT (1931) lowered the resistance of dogs previously infected with *Ancylostoma caninum* by giving them a diet deficient in vitamins A and B and minerals. After the parasites had increased markedly in the dogs they were given an adequate diet which increased their resistance and caused an extreme inhibition of the egg production of the worms.

ACKERT records that among the early difficulties in rearing chickens in confinement was the development of a form of rickets caused by insufficient vitamin D. The investigations of ACKERT and SPINDLER (1929) showed that vitamin D protects the hosts against the effects of parasitism rather than by inhibiting the development of worms.

Other dietary supplements—Returning to the case of the thousand chickens examined at Manhattan by ACKERT in 1927 it was noted that the birds were kept much of the year on rations that were almost wholly of plant origin. Preliminary tests by ACKERT indicated that the inclusion of skim milk as a supplement to the diet produced chickens that were unusually resistant to *Ascaridia*, and later work (1933) showed that a basal cereal ration adequate in vitamins and minerals when supplemented by meat meal and by skim milk produced the most resistant fowls. The cereal ration plus meat meal was second best whereas the cereal ration supplemented by peanut meal (a wholly plant ration) produced the least resistance in the chickens to *Ascaridia*. These results were attributed to the wider range of the amino acids made available from the diets of the first two groups. The work of SHORR (1933) showed that the resistance of hosts to tapeworms is affected by diet. It might thus appear that any deficient diet that lowers the resistance of the host will permit the helminths to increase their development and productivity but such is not always the case as is shown by the inability of *Ascaridia galli* to grow in a host kept on a very deficient diet. ACKERT and WHITLOCK (1935) by giving chickens intramuscular injections of a nutrient solution lacking vitamins A and B and animal proteins lowered the resistance of the chickens without enabling the worms to thrive in the bodies of the hosts. Although many of the injected chickens died of starvation and had their resistance completely broken down fewer and shorter worms remained in them than in the controls fed on a normal diet. Such results indicate that there may be a critical point in the broken resistance of a host beyond which the environment becomes unfavourable for the helminth. The inference from all this work appears to be that in general the natural resistance is lowered to helminths, both in the somatic and intestinal phases when omnivorous hosts are maintained on diets deficient in vitamins A B (complex) or D or on rations with highly restricted sources of proteins.

Genetic constitution as a factor in resistance

That natural resistance to helminthic infections may be due in part to the genetic constitution of the host is indicated both by epidemiological data and experimental results.

Epidemiological evidence—MILLER (1908) observed that pure bred Zebu cattle in Trinidad resisted the ravages of strongyles better than did other breeds of cattle. Race differences in resistance to hookworms in

human beings were noted by SMILLIE and AUGUSTINE (1925) who found that white children were more heavily infected than negro children of the same ages living in the same community and somewhat similar observations have been made by other workers in respect of hook worm, *Ascaris* and *Hymenolepis* infections. CRAM (1940) examined 3,371 children in nursery schools and summer camps, etc. for *Enterobius vermicularis* and found that 41.9 per cent. of the white children were infected as compared with 15.5 per cent. of the negroes. It would thus appear that negroes in the Southern States of America have greater natural protection against helminths than have the whites. This is especially true of hookworms and pinworms. It is difficult to conceive of the negroes living on a higher plane either from the standpoint of nutrition or of sanitation. On the racial immunity hypothesis, the long association of the negroes with the worms would confer greater opportunity for the development of a grade of immunity but whether this would become inheritable by mutations or by other means is problematical.

Experimental evidence—Ackert and his colleagues (1933) found significant differences in the natural resistance of breeds of chickens to *Ascaridia galli*. Such heavy breeds as Rhode Island Reds, White Plymouth Rocks and Barred Plymouth Rocks had fewer and smaller *Ascaridia* than did the lighter White Leghorns and White Minorca breeds. CURTIS *et al* (1933) showed that some strains of rats reacted more often to the production of tumours by *Cysticercus fasciolaris* than did others. After mentioning other work of a similar nature Ackert states that he had obtained additional evidence of genetic strains within a breed by selecting the more resistant cockerels and pullets from one flock of chickens and thereby developing a strain of White Leghorns which was more resistant to *Ascaridia* than were a cockerel and six hens taken at random from another flock of the same breed. Work of this sort suggests that it would be possible to establish by selection a strain of chickens which is quite resistant to *Ascaridia* as well as one which is distinctly susceptible to this nematode. CAMERON (1935) found that Cheviot sheep on an overcrowded pasture were more tolerant of the effects, and less heavily parasitized with, nematodes than were the lowland breeds such as the Border Leicester. Differences in breed resistance of sheep to *Ostertagia circumcincta* were noted by STEWART *et al*. (1937). The work of GREGORY *et al* (1940) suggested that genetic selection would effectively change the degree of resistance or susceptibility to strongyles in populations of sheep.

Age resistance to helminthic infections

Here again, the evidence is both experimental and epidemiological.

Experimental evidence—The first experimental evidence of age as a factor in natural resistance to helminthic infections appears to be that of LOOSE (1911) who found that some of the hookworm larvae fed to young dogs were able to reach maturity whereas this did not happen in the case of adult dogs. RANSOM (1930) obtained similar results with a pig *Ascaris* and also with *Syngaster trachea* in chickens. HERRICK, working in Ackert's laboratory noted a gradual increase in the resistance of chickens to *Ascaridia* as they became older until the fowls reached the age of 103 days after which no further increase was observed. Herrick (1928) also demonstrated age resistance of dogs to

hookworms. Similar evidence has been obtained in respect of *Nippostrongylus muris*, *Heterakis spumosa* and the lung worms *Dictyocaulus filaria*. The tapeworms likewise encounter more resistance in older hosts than in younger ones and AMEEL (1934) has reported an increased resistance with age in snails to larval flukes. Further evidence of host age resistance to flukes has been presented by CABLE (1937) experimenting with metacercariae and gulls. There is thus considerable experimental work indicating that the phenomenon of increased resistance with age may occur in mammalian, avian, amphibian and molluscan hosts to trematode, cestode or to nematode helminths.

Epidemiological evidence—In 1934 KELLER *et al.* showed that after 15 to 19 years of age people develop a resistance to hookworms. They found that the worm incidence fell off rather sharply after the age of 24. In the case of the human *Ascaris* the evidence of age resistance has long been known. The peak of infection percentages in the Southern States appears to be in the age group 7 to 14 years; the group of 15 to 19 years manifests much lower percentages of infections. Similar evidence has been obtained in the case of *Enterobius vermicularis*. Clinical manifestations of schistosomiasis were found by FISHER (1934) to be especially common in Belgian Congo children under 10 years of age but never in persons over 30 years old. There is thus epidemiological evidence that host resistance to many species of nematodes and to some cestodes and trematodes increases with age.

The author then passes to a consideration of the various theories which have been advanced to explain age resistance, and discusses in some detail the recent work of EDGAR and himself (1938) on duodenal mucus and age resistance. Histological studies of the duodena of chickens showed that there were some differences in thickness of muscular layers but the most striking difference was the increasing number of goblet cells in the chickens as they grew older. Experiments showed that the duodenal mucus contained a factor which was unfavourable to the growth of young *Ascaridia galli* and the general conclusion of the work is that although the nature of the natural resistance of older animals has not been completely elucidated there are indications that duodenal mucus from goblet cells contains a thermostable substance which inhibits the development of intestinal helminths.

W. Yorke

OLIVER-GONZÁLEZ (José). The Dual Antibody Basis of Acquired Immunity in Trichinosis.—*Jl Infect Dis* 1941 Nov-Dec. Vol. 69 No. 3 pp. 254-270. With 1 chart. [22 refs.]

LU (Chao). A Survey of the Parasites of Dogs, Cats and Rats made at Chengtu, Szechwan, China.—*Chinese Med Jl* 1941 June. Vol. 59 No. 6 & Sept. Vol. 60 No. 3 pp. 550-564, 244-263 [50 refs.]

The parasites of direct or indirect interest to man were present in 60 dogs, 100 cats and 30 rats in the following percentages—Dogs: *Echinococcus granulosus* 1.7, *Dipylidium caninum* 63.3, *Toxocara canis* 21.7, *Ancylostoma brasiliense* 45.0. Cats: *Clonorchis sinensis* 35, *Paragonimus westermani* 24, *Taenia crassicolis* 63, *Diphyllbothrium mansonii* 55, *D. caninum* 22, *Sparganum* 11, *Belascaris cati* 59, *A. caninum* and *A. brasiliense* 49. Rats: *T. crassicolis* 46.7, *Hymenolepis diminuta* 30, *Strongyloides ratti* 13.3, *Gongylonema neoplasticum* 3.3 but with no cancer.

Clayton Lane

BUTLER (Robert L.) Jr & CHRISTENSON (Reed O.) A Simple Apparatus for determining the Viability of Embryonated Helminth Ova.—*J. Parasitology* 1942 Apr Vol 28, No 2 pp 131-134 With 2 figs.

CARLISLE (Vance) The Pathology of Schistosomiasis of the Appendix and its Relation to Appendicitis.—*South African Med J* 1942 Jan 10 Vol 16 No 1 pp 17-23 [10 refs.]

The histology of schistosomiasis of the appendix is closely allied to that of tuberculosis, yphiis and other types of infective granulomata which, no matter where they occur in the body are accepted as true examples of chronic inflammation. In view of these facts therefore it is suggested that the chronicity of this disease in the appendix be more universally recognized, as it is in the other viscera, and that the specific pathologic term of chronic Bilharzia appendicitis be applied for the purpose of diagnosing such lesion.

Clinically the condition may be devoid of characteristic features.

Acute and subacute exacerbations frequently occur in chronic Bilharzia appendicitis. An acute diffuse appendicitis may follow increased intraluminal pressure with consequent interference to the blood-supply or result from the destruction of the base of a crypt by the necrotizing action of an ovum. It would seem probable that such acute inflammations occurring in appendices already badly damaged by Bilharzia lesions are frequently attended by very severe suppurative and gangrenous processes and often by perforation.

ESPÍN (Jose) Hallazgo de corpusculos semejantes a los de Negri, en un caso de mielitis bilharziana. (Negri-like Bodies in Case of Bilharzial Myelitis).—*Rev. Polidivica Caracas* 1941 Sept.-Oct. Vol 10 No 60 pp 327-336. With 6 figs. English summary (7 lines).

The following is a translation of the author's summary. —

In this note are described certain structures resembling Negri bodies, which stain red, like Negri bodies, with Mann's stain and occupy the same situations in the interior of the nerve cells. The patient was suffering from myelitis due to the eggs of *Schistosoma mansoni*.

The bodies, which are named pseudo-Negri bodies, were found in the motor neurones of the affected medullary zone.

C IV

BOYNE (C) BORSTLAP (A J P) LIE KIAN JOE, MOLEYKAMP (W J J) & YANNING (W) Oortgezet bilharzia onderzoek in Celebes. (Continued Bilharzia Investigation in Celebes).—*Geneesk Tijdschr Nederl Indië* 1942 Jan 6 Vol 82, No. 1 pp 21-36. With 13 figs on 2 plates & 1 chart. English summary.

Simultaneously with the echinostomiasis researches in the lake region of Celebes there has been carried on an investigation into Schistosome infection in man and animals. At Lake Lindoe it was discovered that the village dogs used in hunting pigs and deer were infected like the deer with *Schistosoma japonicum*. No difference could be detected between human, dog and deer worms. They were present in the mesenteric veins of small and large intestine and in the blood vessels of the liver. In deer specially large specimens of worms were found up

to 3 cm in length. It was difficult to obtain faeces from the half-wild dogs but three positive results were obtained in 3 out of 6 samples. Autopsy on one dog furnished dozens of worms. No Schistosome eggs were found in the faeces of buffaloes or horses.

The search in the Lake Lindoe region for the transmitter has been continued especially for snails of the genus *Oncomelania* which are known to spread *Schistosoma japonicum* in China and the Philippines. These were never found nor was any snail discovered shedding furcocercous cercariae. It is interesting to note that although on Lake Lindoe no cercariae with forked tails which looked like *Schistosoma japonicum* cercariae have been found a number of old Lymnaea snails in a lagoon of Lake Poso were found with such forked tail cercariae. These developed into Bilharzia worms in the mesenteric veins of mice but the worms could not be identified as *Schistosoma japonicum*. It may so far be concluded that this Lymnaea is either the carrier of *Schistosoma japonicum* or of an unknown schistosome. This will require further investigation. Some details are given of the morphological characters of the worms found in man, dog and deer.

Autopsies were carried out on one dog, two deer and one man. The intestines did not show any bilharzial ulceration. In the human autopsy the liver and spleen were enormous weighing 2300 and 3200 gm respectively. The Lindoe district is malarious however. The microscopical picture was identical in all three kinds of hosts. Eggs were present in the intestinal wall especially in the submucosa and also in the liver. There were also some eggs visible in the lung capillaries.

W F Harvey

BONNE (C) BORSTLAP (A J P) LIE KIAN JOE MOLENKAMP (W J J) DE MOOR (C E) & NANNING (W) Voortgezet onderzoek over echinostomiasis in Celebes [Continued investigation of Echinostomiasis in Celebes.]—*Geneesk Tijdschr v Nederl Indië* 1942. Jan 6 Vol 82 No 1 pp 3-20

The object of these researches was to determine the extent to which the echinostome infections on the central Lake Lindoe shore occurred also among the inhabitants round other lakes in Celebes and what were the molluscs transmitting the infection.

1. *The occurrence of echinostomiasis on the lakes and coast of Celebes*—There could be no accident about the human echinostomiasis round Lake Lindoe. It was not merely a localized example of a generalized infection of animals as is the case in Java where the reservoir host is the field rat which probably infects the mollusc and reinfects itself by ingestion of the mollusc. Man in that case is not necessary. He only provides the opportunity for rats and snails to come together by means of his rice fields while he himself only contracts infection as an incident if he ingests the snails. On Lake Lindoe however there exists such a high degree of infection of the transmitting molluscs (the snail *Anisus sarasinorum* as the first host and mainly the mussel *Corbicula lindoeensis* as second intermediate host) close to human dwellings compared with more distant places that the human being must be regarded there as the chief source of infection of the molluscs. The infective adjustment there is one of man, snail and mussel to one another.

The lakes in Celebes are of two types, one in the mountainous regions and the other in the plains. Lake Lindoe is one of the mountain lakes.

A detailed consideration is given to each lake in turn. In the case of Lake Lindoe the inhabitants are fairly highly infected an infection contracted by eating the insufficiently cooked mussel *Corbicula lindoeensis*. Besides the mussel, *Viviparus rudispellis* [a pulmonate snail] is also heavily infected, but this infection is not necessarily through man. It can be effected through the rat mouse duck or pigeon. The host is *Anisus sarasinorum* which is present in enormous numbers in the lake. The mussels and also the *Viviparus*, as second hosts, carry the metacercariae of *Echinostoma lindoeensis* [*E. lindoeense*] with 37 spines and also another with 45 spines. The adult of the latter is not known in man in Lindoe and its host is probably the rat so that it may in fact be the fluke *Emparyphium murinum*. For this also *Anisus sarasinorum* is the first host. Finally it is apparent that *Pila axipal-lacea* which is probably only an extremely large form of the usual *Pila conica* carries metacercariae of the fluke *Emparyphium ilocanum* just as it does not only in Celebes but also elsewhere in the Netherlands Indies and in the Philippines. Feeding of *Pila* to rats infects them with *Echinostoma* having 51 spines, the number of spines appropriate to *Emparyphium ilocanum* with which also the morphology of the worm is in agreement. Here also on Lake Lindoe the rat is the normal host for *Emparyphium ilocanum* although natural infection has not been demonstrated.

The mollusc fauna of the coast region of Celebes is to be compared in many respects with that of Java. In the coast region as well as in the high and low-lying lakes a *Pila* infection with *Emparyphium ilocanum* is met with, and *Viviparus* is sometimes infected. The condition is much like that in Java where this type of infection occurs among the ricefield snails.

Among the mountain lakes Lindoe has a special position in its infection of human beings by *E. lindoeensis* with first and second intermediate hosts *Anisus sarasinorum* and *Corbicula lindoeensis* respectively.

11 Search for a reservoir host for *E. lindoeensis*.—In man up till now only *E. lindoeensis* with 37 spines had been found, but the Lindoe mussels carry metacercariae of two kinds, one with 37 spines and one with 45 spines. Where does that with 45 spines come from? Summarizing it can be said that —(1) On Lake Lindoe no reservoir host rat duck or other water bird is known for *E. lindoeensis* (with 37 spines) but that on Lake Poso an old rat was once found infected with adult echinostomes which could not be differentiated from *E. lindoeensis*. (2) The host for the echinostome with 45 spines, of which the metacercariae live in the Lindoe mussels, is still unknown. (3) The reservoir host for *E. ilocanum* on Celebes, as in Java is the rat at least in the coast region.

Tabulation of all the material facts especially as regards species locality frequency material and experimental infection, etc. for molluscs, cercariae and metacercariae is given in conclusion to this article.

W F Harvey

BEUKEMA (W) Een infectie met *Hymenolepis nana*. [Infection with *H. nana*].—*Geneesk. Tijdschr. v. Nederl. Indië* 1941 Sept 23 Vol 81 No 38. pp 2014-2020 [11 refs.] English summary

Description of an infection with *Hymenolepis nana* in an Indo-Chinese man of 24 years. OET DJOEN HOAT found this tapeworm in Long Iram in two Dayaks (a woman and a girl of 6 years). A short

survey is given about the particulars of the worm as described in the literature. The patient had practically no symptoms.

The cure with semen cucurbitae (laboe merah) is recommended as pleasant and effective in comparison with oil of chenopodium which failed in this case.

CLAPHAM (Phyllis A) An English Case of *Coenurus cerebralis* in the Human Brain.—*Jl Helminthology* 1941 Dec Vol 19 Nos. 3/4 pp 84-86

This is believed to be the second instance of the recognition of *Coenurus cerebralis* in the brain of man the fact that it was discovered by accident suggests that it may be commoner than supposed.

A man of 39 was discharged from the Royal Navy in 1932 his service having covered the Mediterranean where the infection is widely distributed (though it is common enough in animals in England) he had also visited the West Indies. He began to have severe headaches in 1936 which may point to his having got the infection in Britain and in one attack he became comatose and died. Severe haemorrhages were found in the pons the lateral ventricles were somewhat enlarged (he had had cerebrospinal fever at 16) in the posterior horn of the lateral ventricle was situated a well developed matured coenurus of typical appearance and having over 700 scolices in groups of 10 to 80 in each. About half were atypical—irradiate tetra-radiate with six to eight suckers and one or two rostellum. The hooklets were rather small. One rostellum was completely unarmed others had ill formed hooklets some having only blade and guard, some being merely irregular masses of chitinous. The specimen is in the museum of the London School of Hygiene and Tropical Medicine Clayton Lane

CULBERTSON (James T) & GREENFIELD (Sylvia H) Effect of Atabrine upon Experimental Cysticercosis of Mice.—*Jl Pharm & Experim Therap* 1941 Oct Vol 73 No 2 pp 159-161

The experiment presented above shows rather clearly that atabrine either prevents or retards the development of *Cysticercus fasciolaris* in the albino mouse. It should be borne in mind however that the effect obtained may be largely prophylactic since the atabrine was first given prior to the infection of the mice. In additional experiments which have not been included in this report the administration of the drug was withheld for several weeks until the cysticerci had become established. Under this circumstance the effect of the atabrine was distinctly less and usually was not significant. The application of drug therapy to human cysticercosis or to a related cestode infection echinococcus (hydatid) disease must evidently await the discovery of a substance more effective than atabrine appears to be upon the established cyst. It seems possible that one of the other acridine derivatives might serve this purpose.

ALLISON (B J) Treatment of Acute Carbon Tetrachloride Poisoning Report of Two Cases.—*Ann Intern Med* 1942 Jan Vol 16. p 81 [Summary taken from *Jl Amer Med Assoc* 1942 May 9 Vol 119 No 2 p 226]

Allison cites 2 cases of acute carbon tetrachloride poisoning 1 in a 9 year old boy from inhalation and 1 in a man of 48 an alcoholic addict

who died ten days after drinking cleaning fluid. During the ten days symptoms and signs of extensive damage to the liver kidneys and gastro intestinal tract were present. A necropsy confirmed the clinical manifestations. The boy had smeared red chalk on the covers of his bed, and in the process of cleaning it up with a tin of cleaning fluid he discovered that he liked the odor of the fluid and the way it made him feel. He poured a considerable amount on the blanket replaced the tin and crawled into bed. He said that he saw stars and then couldn't remember anything. A few minutes later the boy was found under the covers completely unconscious and breathing noisily. He was completely anesthetized for more than two hours. It is possible that there was some absorption through the skin. Definite evidence of hepatic damage occurred the next day—enlargement tenderness and pain in the liver—a trace of bile in the urine—a high fever and leukocytosis. The importance of early intravenous administration of calcium and dextrose was not appreciated and as the blood calcium was high calcium was given only by mouth. There was little evidence of renal damage. Hepatic tenderness persisted for two weeks and enlargement for a month. These physical signs and an evening fever an increase in the polymorphonuclear leukocyte count and a slight elevation of the blood sedimentation rate indicated that repair was not complete in three weeks. During the next six weeks an elevation of temperature to between 100 and 101 F on slight exertion indicated continued disturbance as no other cause could be found for this fever. The author suggests the following outline for the treatment—removal of all unabsorbed carbon tetrachloride from the gastrointestinal tract forcing of fluids by mouth and intravenously prevention or treatment of signs of intoxication and organic damage, transfusion of blood or blood plasma if much blood has been lost repetition of the chemical study of the blood until it returns to normal and complete rest in bed until evidence of hepatic and renal damage has disappeared. Carbon tetrachloride poisoning presents a definite health hazard. The proper labelling of products containing it should be required by law and writers of textbooks should consider carbon tetrachloride poisoning a disease entity and thus make its nature and treatment known.

LAWLER (H. J.) The Relation of Vitamin A to Immunity to Strongyloides Infection.—*Amer J Hyg* 1941 Nov Vol 34 No 3 Sect D pp 65-72. [24 refs.]

Rats observably deficient in vitamin A were found to have lower resistance to a primary infection and less immunity to reinfection with *Strongyloides ratia* than did control animals. The weakening of the defensive functions of specialized epithelia did not seem to account for this increased susceptibility to worm parasitism. Therefore some additional element of the immune mechanism appears to be weakened in the deficiency—this element may possibly involve an intimate relation between vitamin A metabolism and the reticulo-endothelial system. [See also ACKERT above.]

GERRING (E. G.) Notes on Ethiopian Simuliidae III.—*East African Med J* 1941 Oct Vol 18 No. 7 pp. 210-218.

MOOREHEAD (V. N.) Life History of *Dracunculus medinensis*—Reprinted from *Indian J Surgery* Vol 3. No. 4 8 pp. With 11 figs. on 1 plate. [17 refs.]

MOORTHY (V N) Guinea-Worm Cyst—a Case Report.—Reprinted from *Indian Jl Surgery* Vol. 3 No 4 4 pp With 1 fig

This lad was treated for separate guineaworm infections in 1929 from 1931 to 1934 and again in 1936. He was the only one of a family of 14 which for several generations had been using the same infected step well who got this infection repeatedly.

In 1929 a degenerate worm was extracted with difficulty and in bits from an unstated site. In 1933 a swelling appeared in the left lower popliteal region and by 1934 had reached the size of a big coconut being slightly movable and having over it movable but ulcerated skin. Fluid aspirated from it contained dead and partly calcified *Dracunculus* larvae. Its removal was followed for two days by fever, persistent vomiting and urticaria probably caused by escape of some fluid during the operation and was cured by calcium and adrenalin. When it was opened there was disclosed a partly calcified worm lying in a fibrous tunnel scrapings from whose walls showed that eosinophils formed 82 per cent of its cells their percentage in the blood being 13. In 1936 a blister appeared about the right ankle ethyl chloride spraying made the worm empty her uterus after four days and she was got away partly by traction and partly by cutting. Clayton Lane

JOB (T J) Food and Feeding Habits of the Glassfishes (*Ambassis* Cuv & Val) and their Bearing on the Biological Control of Guinea-Worm and Malaria.—*Indian Jl Med Res* 1941 Oct Vol 29 No 4 pp 851-862. With 2 figs. [25 refs]

The glassfishes comprise some of the smallest perches, most are marine but some half-dozen species acclimatized to fresh water are found all over India and Burma. *Ambassis nama* (Ham) and *A. ranga* (Ham) are the most widely distributed species and are found in both standing and running waters. In an interesting paper the author describes the analyses of the gut-contents of 268 *A. nama* and 313 *A. ranga* field experiments to determine their capacity to check mosquito breeding and to reduce the density of *Cyclops* and feeding experiments in an aquarium. The results of all these observations show that glassfishes may check mosquito breeding but only to a small extent and that most of the mosquito larvae consumed are *Culiseta* from the sub-surface. They subsist mainly on minute Entomostracans found abundantly in the mid water plankton. *Cyclops* form a high percentage of their natural diet sometimes almost to the exclusion of other elements so that these fishes with their specialized gill arches adapted for filtration stand out as voracious feeders on *Cyclops* throughout their life. It would seem that they may have an important rôle to play in the biological control of guineaworm disease. Norman White

SLIWENSKY (M) Drei Fälle von *Gongylonema pulchrum* bei Erwachsenen in Bulgarien [Three Cases of *G. pulchrum* Infection in Bulgaria].—*Dent Trop Ztschr* 1941 Dec. 1 Vol. 45 No 23 pp 712-714

The author refers to the fact that *Gongylonema* is normally a parasite of cattle, sheep, goats and pigs and that the larval stages are

passed in members of the genera *Blatta*, *Blaps*, *Tenebrio*, *Aphodius* and *Onthophagus*. Although he does not regard this infection as a direct cause of cancer he adheres to the opinion that it has some influence in this respect. He records three cases of human infection, all in young people. In two the worms were found beneath the mucous membrane of the lip and gum. The worms were identified by FÜLLEBORN or REICHENOW. Symptoms included itching sensation of a foreign body and slight pain induced when hot drinks were taken.

C II

ASHBURN (L. L.) Appendiceal Oxyuriasis. Its Incidence and Relationship to Appendicitis.—*Amer Jl Path* 1941 Nov Vol 17 No 6 pp 841-856 [29 refs]

Threadworms are found as often in normal appendices as in those that show chronic inflammation and more often than in those that are acutely inflamed.

Each appendix was sectioned in three blocks—proximal, medial and distal—and sections were examined from each. The author's conclusions are as follows—

"1 In a series of 2,317 surgically removed appendices oxyurias were found in 184 (7.94 per cent). Seventy-nine were positive in the sectioned material and in 105 oxyurias were found only by examination of the removed appendiceal contents.

2 Of the 34 appendices showing oxyurias in section and having fecal material in all three blocks, only one level was positive in 23 cases (67.65 per cent), two levels were positive in 7 (20.58 per cent) and all three levels were positive in 4 cases (11.76 per cent).

3 The incidence of appendiceal oxyurias was found to be 2.63 per cent for the white beneficiaries of the United States Public Health Service hospitals, 10.04 per cent for Indians of the United States, and 23.91 per cent for Eskimos and Aleutians.

"4 The highest incidence occurred in the 7 to 11 year age group being (for the entire series) 15 per cent for males and 22.22 per cent for females. The decrease in incidence was gradual until the 32 to 36 year period at which a second peak occurs, 7.44 per cent for males and 15.86 per cent for females. Appendiceal infestation is rare after 51 years of age.

"5 Infestation is more common in appendices from females than from males. For the 2 to 46 year age period, the ratio is 1 male to 2.34 females.

6 Comparison of infested and control (negative) appendices showed that local eosinophilia is not significantly increased by infestation with oxyurias.

7 Oxyurias occurs as frequently in normal appendices as in appendices showing chronic inflammation and more frequently than in acutely inflamed appendices.

"8 Of the 79 cases showing oxyurias in the lumen of the sectioned appendix, 13 showed the worm in contact with mucosa. Of these showed pressure atrophy of epithelium with formation of shallow crescent-shaped depressions. Rarely there was a little karyorrhectic necrosis, but no inflammation or hemorrhage was found.

"9 One appendix showed an oxyurid in the deep part of the mucosa. The lack of inflammation, necrosis or hemorrhage shows that the invasion occurred postoperatively.

"10 No case of appendicitis oxyurica occurred in this series. *Enterobius (Oxyuris) vermicularis* is not etiologically related to appendicitis."

Clayton Lane

OFFUTT (Edward P) Jr & MCCOY (O R) The "Gopher" *Citellus richardsoni* (Sabine), as an Experimental Host for *Trichinella spiralis*—*Jl Parasitology* 1941 Dec. Vol 27 No 6 pp 535-538

The gopher *Citellus richardsoni* (Sabine) was found to be very susceptible to infection with *Trichinella spiralis*. Ten of 14 animals fed doses as small as from 2 to 5 larvae per gm. of body weight succumbed. Adult worms persisted in the intestines of most animals for long periods of time 13 weeks being the maximal period observed. Five gophers that were reinfected showed no resistance to the test doses of larvae that were employed.

DEFICIENCY DISEASES

BOWE (J C) Alcoholic Beriberi Heart.—*Lancet* 1942 May 16 pp 586-587

Two cases are here recorded one almost certainly a case of beriberi heart the other probably since it cleared up on administration of vitamin B₁. The former was a warrant officer 33 years of age with painful and swollen legs and dyspnoea on slight exertion he had been a year in Iraq and another in Aden and was a fairly heavy drinker to six pints or more of beer daily. The heart was enlarged the second sound reduplicated and bruits were audible over the carotids blood pressure 122 and 48. Ankles were oedematous leg muscles tender patellar and ankle reflexes not elicited plantar sluggish. He was given vitamin B₁ (Benerva) 5 mgm b d intramuscularly the first day of treatment thrice the next day and 1 mgm t d for the next six days or 43 mgm in all. Bemax and marmite were also given and when the Benerva was stopped two tablets of Betaxan thrice daily were substituted. In about nine weeks the patient was able to undertake light duty and the reflexes had returned though some tenderness on pressure of the leg muscles persisted. Three weeks later he returned to full duty.

The second case was similar as regards the cardiac signs but there was no indication of neuritis and the author classes it as belonging to Aalsmeer and Wenckebach's third group in which patients are seriously ill with vomiting dyspnoea restlessness epigastric pain enlarged heart dependent oedema engorged veins tachycardia and low diastolic pressure. [Diagnosis made on the result of treatment is not always safe and investigation of the diets of the units from which these patients came revealed no lack of vitamin B₁.] H H S

KERLEY (C G) & LORENZE (E J) Beriberi in a Male Child Two and One-Half Years of Age—*Jl Pediatrics* 1941 Vol 19 pp 526-528 [Summary taken from *Nutrition Abstracts & Reviews* 1942 Apr Vol 11 No 4 p 646 Signed L WILLS

A child of 2½ years fed for several months largely on a milled white cereal showed no physical abnormality except the symptom complex of pseudo-muscular dystrophy and acute peripheral polyneuritis. The treatment consisted of regular meals containing milk meat eggs vegetables and fruit with 15 mg 50 per cent percomorph oil daily and 50 mg nicotinic acid in divided doses daily for 3 days subsequently.

reduced to 12.5 mg. daily. Cure was apparent in 11 days and a year later the child was normal. Nicotinic acid was used instead of vitamin B₃ because it had already been found potent in neuritic disorders in children.

BEAN (William Bennett) SPIES (Tom Douglas) & BLANKENHORN (Marion A.) The Incidence of Pellagra in Ohio Hospitals.—*Jl Amer Med Assoc* 1942 Apr 4 Vol. 118 No. 14 pp. 1176-1179 With 1 chart. [11 refs.]

In order to determine the incidence of pellagra in the Northern United States, admissions to two general hospitals in Ohio—Lakeside Hospital, Cleveland, and the General Hospital, Cincinnati—have been examined statistically. It was found that the disease is in fact widespread, contrary to older belief and that it accounted for 1 to 2 per cent of total admissions. Variations in reported incidence in the past have been due to variations in recognition of the disease. This is of course especially true of non-recognition of cases exhibiting minimal deficiency symptoms.

Curves showing the seasonal incidence in this northern State are given, and it is of interest to note that the alcoholic and secondary cases in Ohio follow the same trend in seasonal variation as endemic cases in the southern States, thus suggesting the essential unity of pellagra of endemic, alcoholic and secondary origin, and that other features than summer sunlight are important in this seasonal tide. [This is an interesting confirmation of the views put forward by the reviewer a number of years ago.]

H. S. STANNUS.

TROWELL (H. C.) A Case of Pellagra of the "Infantile" Variety in a Ruanda Adolescent showing Signs of Deficiencies of Nicotinic Acid, Riboflavin and Nutritional Macrocytic Anaemia.—*East African Med. Jl* 1942. Jan. Vol. 18. No. 10 pp. 289-294 [15 refs.]

The description of an interesting case exhibiting the symptoms commonly recognized in East Africa as those of infantile pellagra. A native of Ruanda, aged about 15 years, showed glossitis, gastro-enteritis, crazy pavement dermatosis, pale hair and skin, oedema, mild neurological signs together with cheilosis, kerato-folliculitis of skin and a macrocytic anaemia. There was but an incomplete response to nicotinic acid, neo-hepatex, iron marmite and full diet.

H. S. STANNUS.

FISCHER (Arthur) Darmtuberkulose als Ursache von Pellagra. [Intestinal Tuberculosis as a Cause of Pellagra.]—*Dtsch. Tuberkulose Blatt* 1942 Feb Vol. 16 No. 2 pp. 25-31

The causes of pellagra are reviewed with especial reference to those resulting in deficient absorption from the alimentary canal.

Two cases of tuberculosis involving the intestines are then described in which the manifestations of pellagra appeared. The patients, who were both young men, were treated with "Nicobion" a nicotinic acid

preparation with resulting amelioration of the pellagra. One of the patients whose tuberculosis was advanced eventually died but the general condition of the other was considered to be influenced favourably after remission of the pellagroid symptoms.

The cause of the pellagra in these cases is discussed, and is attributed to the disturbance in absorption from the gut brought about by the tuberculous lesions.

[See also HURST below (Sprue)]

L J Davis

SPRUE.

HARRIS (Seale) & HARRIS (Seale) Jr The Genesis of Pellagra, Pernicious Anaemia and Sprue.—*Amer Jl Digestive Dis* 1942. Jan Vol 9 No 1 pp 29-35

Basing their views mainly on clinical data these authors believe that pernicious anaemia, pellagra and sprue are not in any way to be regarded as different manifestations of the same disease but as three separate and distinct diseases.

There are symptoms which may be common to all three including gastro-intestinal and nervous manifestations and macrocytic anaemia, so that it may well be that in an adult with achlorhydria, diarrhoea mental depression and motor manifestations due to involvement of the lateral and posterior columns of the cord with severe anaemia, but without skin lesions it may be impossible to make a positive diagnosis either of pellagra, pernicious anaemia or of sprue.

The arguments are supported by illustrative cases seen in family practice as well as culled from the literature. It is concluded that pellagra, pernicious anaemia, and sprue are allied nutritional diseases. Importance is attached to atrophic changes in the liver which are common to all three diseases and this essential pathology is adduced as evidence of their similarity.

The somewhat puzzling outlook on this complicated problem can be illustrated by an account of combined pernicious anaemia and sprue in the same patient in which dramatic improvement followed the use of canned liver. The authors' views are open to criticism in that there is nothing to indicate that the anaemia was anything more than macrocytic anaemia which is the inevitable part and parcel of sprue.

[The style of the article is confusing and many statements are obscure and contradictory. Much of it has been lifted bodily from the recent book on Pellagra (1941) by the same authors and although the paper is written by father and son in conjunction yet many of the statements are made in the singular.]

P Manson Bahr

HURST (Arthur) Sprue Syndrome from Obstruction of the Lacteals by Chronic Tuberculosis of the Mesenteric Lymph Nodes.—*Guy's Hosp Rep* 1942. Vol 91 (Vol 21 4th Ser) No 1 pp 25-34 With 3 figs. [18 refs.]

See also FISCHER above (Pellagra)

RODRIGUEZ MOLINA (Rafael) Sprue in Puerto Rico A Clinical Study of 100 Cases.—*Puerto Rico Jl Public Health & Trop Med* 1941 Dec Vol. 17 No 2 pp 134-151 With 2 figs. [Refs. in footnotes] [Spanish version pp 152-168.]

A clinical study of 100 cases—57 males and 43 females from 12 to 78 years of age the mean being 40.14. The series comprised 87 white, 13 coloured, of whom two were full-blooded negroes. 88 were natives of Porto Rico. Only uncomplicated cases were selected, but 16 per cent harboured intestinal parasites—hookworm, *Strongyloides*, *Ascaris*, whipworm or amoebic cysts.

Dyspepsia, abdominal distension and epigastric distress were prominent in 87 per cent. In 80 per cent there were weakness, diarrhoea, emaciation, soreness of tongue and mouth and anorexia. Intolerance of food declared itself after ingestion of rice and beans.

Some aberrant features are recorded: tenesmus in 35 per cent, blood and mucus in the stools of 20 per cent, tarry stools or fresh blood in some. Nerve disturbances, numbness and paraesthesias occurred in 14 per cent. Anaemia of several types was encountered. The haemoglobin values ranged from 28 to 100 per cent. A normocyte blood picture was present in 7 per cent, microcytic in 1 and hypochromic in 2 per cent. Macrocytosis is an early manifestation. No ulceration of lips or margins of the mouth (cheilosis) was observed. Free hydrochloric acid was present in the gastric juice in 82 cases. Occasionally there were changes in the skin resembling pellagra, but no erythemas or ulcerations.

Oedema was present in 40 per cent, most frequently in feet and ankles. Pyrexia was another feature recorded in 37 per cent. Rather exceptional was the absence of shrinkage of the liver, which was present in 10 per cent only. Moreover the copious foul stools as usually described were not seen, but the colour was usually golden or brown. It is considered that low value for blood calcium between 8.5 and 9 mgm. may be of little significance in a country where the normal daily intake is so low.

By a combination of gastroscopy and sigmoidoscopy it is possible to state that changes are seen corresponding to those of acute glossitis and stomatitis.

It is concluded that the sprue syndrome is a deficiency state and that the anaemia is caused by gastro-intestinal dysfunction combined with failure of adequate absorption of nutritional substances essential to erythropoiesis.

Gastrointestinal symptomatology and changes in skin and mucosa are associated with a deficiency in vitamins A and B.

P. Manson-Baker

OETTEL (H.) & THADDEA (S.) Significance of Hypoproteinaemia in Nontropical Sprue.—*Dent Arch f Klin Med* 1941 May Vol 187 p. 353 [Summary taken from *Jl Amer Med Assoc* 1942 Feb 21 Vol 118 No 8 p. 675.]

Oettel and Thaddea investigated the problem of protein balance in nontropical sprue. They maintain that reduction of the plasma protein with edema may exist years before the appearance of intestinal disorders, for this reason it is doubtful whether the primary disturbance of sprue is always to be found in the intestine. In only one patient did

the protein deficiency of the plasma run parallel to the gastrointestinal symptoms. In two others protein deficiency of the plasma existed years before sprue symptoms appeared. The combination of adrenal cortex extract and liver preparations is particularly effective in the treatment. Extracts of the anterior pituitary are ineffective. Since results could be obtained with transfusions and with adrenal cortex preparations it can be assumed that the protein formation in the liver and bone marrow is unpaired. Disturbances in protein formation as well as in absorption play a part in the pathogenesis of nontropical sprue. The disturbance in the plasma protein formation may be the clinico-chemically detectable onset, the vicious circle which follows results in secondary disturbances in the intestinal absorption. The functional impairment of the adrenal cortex which is likewise secondary explains such clinical signs as absorption disturbances in pigments, plasma proteins and fats. Nontropical sprue predisposes to hypovitaminosis A. Metabolism salt and mineral metabolism become secondarily impaired. Relation to incretory [endocrine] glands can be explained by the close relationship between hormones and vitamins. There is so far no proof for the causative rôle of the hypophysis and the adrenal glands in nontropical sprue. The theory that the disturbance in intestinal absorption is caused by hypoproteinemia and that it develops parallel with other manifestations of failing function (edema, hypocalcemia, nephrosis) is supported by the authors' observations.

HAEMATOLOGY

DANESHEK (William) *Hematology. Anemia, with Particular Reference to the Hemolytic Syndrome.*—*New England Jl of Med* 1942 Feb 26 Vol. 226 No 9 pp 339-346 [66 refs.]

This is a review of recent work which deals with hypochromic microcytic and hyperchromic macrocytic anaemia and with the haemolytic syndromes. Of special interest to readers of this *Bulletin* are the haemoglobinurias, favism and sickle-cell anaemia, which are dealt with briefly.

C IV

KLINEFELTER (Harry F) *The Heart in Sickle Cell Anemia.*—*Amer Jl Med Sci* 1942 Jan Vol. 203 No 1 pp 34-51 With 6 figs [29 refs.]

Cases of sickle cell anaemia show diffuse enlargement of the heart and commonly systolic and diastolic murmurs. There is a third heart sound at the apex with an accentuation of the second pulmonary sound and a systolic murmur at the base. The P R interval is often prolonged. In comparing the similarities between rheumatic fever and this disease it is noted that in sickle cell anaemia the pain is not confined to the joints and there is little response to salicylates. The diagnosis of rheumatic heart disease has not been confirmed at autopsy in case of sickle cell anaemia. Congestive heart failure not responsive to digitalis is common only in the terminal stages. It is probable that the cardiac changes are due to the prolonged severe anaemia with its consequent anoxaemia.

The pathological state of the heart is more marked than in other anaemias as this type is of longer duration than the other severe anaemias. The prolonged A V conduction time is explained as due to increased vagal tone again secondary to the anaemia. Even though the clinical picture resembles rheumatic fever there is no proved instance of the two diseases occurring together there appears to be no reason to regard patients with sickle cell anaemia as specially liable to rheumatic fever

W P Kennedy

VENOMS AND ANTIVENENES.

TAYLOR (Elizabeth) Snake Bite and Pituitrin. [Correspondence.]—
Med J Australia. 1942 Feb. 23 29th Year Vol 1 No. 9
p 271

The author reports three cases of bite by the death adder (presumably *Acanthophis antarcticus* see this Bulletin 1939 Vol. 38 p 568). This snake is common in the Northern Territory of Australia, and its bite is regarded by the natives as invariably fatal. During one month she treated the three cases by giving pituitrin (1-0 cc. for an adult) as soon as possible and repeating the dose in 2-4 hours. At the same time the usual snake-bite treatment not detailed was given and the patients were wrapped in blankets, with hot water bags and given hot milk and brandy until the condition improved. After 3-4 hours there was no distress in breathing and the pulse improved after a few days all the patients recovered. The action of the venom of *A. antarcticus* is largely neurotoxic.

C W

CLARK (Herbert C.) Venomous Snakes. Some Central American Records. Incidences of Snake-Bite Accidents.—Am J Trop Med 1942 Jan Vol 22 No 1 PP 37-49 [12 refs.]

The author reports on the identification of over 3 000 snakes from Tela, Honduras the identification was carried out at Harvard University. The commonest poisonous snakes were *Bothrops atrox* (fer de lance) *B. asper* and *B. rance* (hog-nosed vipers) *B. schlegelii* (horned palm viper) *B. lateralis* and *B. nigrolineatus nigrolineatus* (both tree snakes) *B. godmani* *B. swainsoni* (jumping snake) *Lachesis* (brushmaster). It is noted that *Crotalus terrificus* though found in Panama, Costa Rica and Colombia, was not found in this survey it prefers dry tableland or desert regions. Of the Elapidae several species of *Microurus* are recorded, but they are not of great importance.

It is pointed out that snake bite is not common in spite of the number of poisonous snakes and that serious cases resulting in death are rare. In three years there were 104 cases with 7 deaths. Most of the bites were on the hands or legs below the knee. The venomous snakes are usually nocturnal in habit, and are able easily to capture rodents. It takes about two weeks for the glands to regain their maximum capacity of venom after complete discharge and it is probable that, as the glands are well emptied in striking a small animal, and are probably frequently emptied because rodents are plentiful, bites in man may often be made with only partial discharge of venom. Young snakes may not be able to swallow rodents and may be active in the daytime and therefore dangerous to man.

In treatment it is pointed out that the essential measures to be effective should be taken immediately after the bite and that the elaborate procedures which have from time to time been advocated may not be applicable. The first step should be to kill the snake for identification. A tourniquet to stop venous but not arterial flow is advocated it should be released for a few seconds every 10 minutes and extraction of the venom by suction should be started at once. Suction may be applied by the mouth over a thin sheet of rubber laid over the bite. This should be continued vigorously for five minutes and the site should then be washed and suction repeated. Incisions at the site are not advised as they may merely hasten absorption. Antivenene should be given subcutaneously and the tourniquet should be kept in position for an hour after the administration of antivenene. Alcohol is contraindicated and permanganate cannot reach the droplets of venom beneath the skin.

In Central America 80 to 85 per cent of bites are due to species of *Bothrops* and anti bothropic serum can be used with a good chance of effectiveness in all cases. C H

ARANTES (J B) & NEIVA (Cicero) VII Toxicidade do veneno de *Micrurus frontalis* para o cobaio a Via subcutanea. [Toxicity of the Venom of *M frontalis* for the Guinea pig.]—*Brasil Medico* 1942 Feb 28 Vol 56 No 9 pp 97-98 English summary (5 lines)

Experiments were conducted by subcutaneous injections into guinea pigs weighing 330-380 gm. in order to investigate the action of the *Micrurus frontalis* venom. The minimum lethal dose was ascertained as 0.3 mg.

ARANTES (J B) & NEIVA (Cicero) VIII Toxicidade do veneno de *M frontalis* para o cobaio b Via intramuscular [Toxicity of the Venom of *M frontalis* for the Guinea pig.]—*Brasil Medico* 1942 Feb 28 Vol 56 No 9 p 98 English summary (4 lines)

The minimum lethal dose of the *Micrurus frontalis* venom was ascertained by intramuscular injections as 0.25 mg in experiments on guinea pigs weighing 330-380 gm.

GAJARDO TOBAR (R.) Bite of Wheat Spider (*Latrodectus mactans*)—*Rev Méd de Chile* 1941 Nov Vol 69 p 707 [Summary taken from *Jl Amer Med Assoc* 1942, Apr 4 Vol. 118 No 14 p 1259]

Gajardo Tobar describes observations in 23 cases of bite by the black widow spider *Latrodectus mactans* a species found throughout Western America from California to Patagonia. The spiders are most numerous during the dry months. Harvesters, stokers and threshers are most exposed. The bite produces a sensation of lancinating and if the cause is searched for the spider may be found in the clothing. The venom of *Latrodectus mactans* is neurotropic. The bite is followed by a ten minute latent period after which the local pain recurs and rapidly increases to involve the entire body. Clonic contractions, tremors, spasmodic movements and convulsions follow. The symptoms and pains are intermittent and reach their maximum intensity in the

waist, arms and legs. The muscular contractions and the extruding pain bring about rigidity of the abdomen and of the chest. The patient experiences precordial and abdominal oppression and has the feeling of approaching death. There may be disorientation, hallucinations, delirium debilitating sweat, profuse salivation and lachrymation. The sensitivity of the skin and the reflexes are exaggerated. The respirations are rapid and shallow. Temporary tachycardia is followed by bradycardia. The arterial pressure increases and later falls. Albuminuria and uremia develop. Intestinal and vesical paralysis develop and the urinary secretion is diminished. There may be priapism, ejaculations and enuresis. After a few hours the symptoms abate somewhat only to return in paroxysms. The disorder persists for a week. The convalescence is characterized by physical and mental fatigue. The literature reports fatal cases but as a rule the patients recover. The bite confers a temporary immunity. In animals, the immunization persists for about three months. Persons have been bitten by *Latrodectus mactans* several times and each time have had all the symptoms of poisoning. The treatment is chiefly symptomatic. Hot baths, morphine and atropine sulfate are employed to counteract pain, convulsions, and spasms. Sparteine and camphor liniment are administered as cardiac stimulants. Physologic solution of sodium chloride, dextrose solution and thiamine hydrochloride are given to counteract the intoxication. It would be most desirable to obtain a specific serum as recommended by Vellard and as prepared by Trousse in Argentina. The difficulty in producing a specific serum is the insufficient quantity of venom available.

GAJARDO TOBAR (Roberto). Las arañas y su veneno. Spiders and their Poison. —*Medicina Moderna* Valparaiso 1941 Nov Vol 15 No 4 pp 147-151. With 3 figs.

A discursive paper with general remarks on the Black Widow spider (*Latrodectus mactans*) and tarantulas. No illustrative cases are recorded. There is a good illustration of the former. H H S

DERMATOLOGY AND FUNGUS DISEASES

AGUIRRE PEQUEÑO (Eduardo). Un documento de gran valor casi ignorado en la historia del mal del Pinto. Comentario a las investigaciones practicadas por el Dr. Guillermo Téllez, durante los años 1880-1889. A Little-known Document on Mal del Pinto. —*Medicina* Mexico 1942 Jan. 25 Vol 22 No 404 pp 13-23. 76 refs.

In view of the recent ideas that Mal del Pinto is a form of or closely allied to yphria, the following is of considerable interest. Dr. Guillermo Téllez attended a Congress of the Academy of Medicine in 1879 at which he heard a good deal of discussion on Pinto or Mal del Pinto. He was not convinced on several points and moved to Iguala, in the province of Guerrero to devote himself to a study of it. After eight years of intensive investigation he published a monograph in 1889, a work in 44 pages, the first chapter of which treats of its definition, synonymy and history and he designates the disease as "a venereal, apyretic, contagious and congenital affection," and later "a kind of

syphilis. Elsewhere he makes the following observations. Pinta is a septic poisoning of syphilitic nature its cutaneous manifestations simulate syphilitic exanthemata the different colours are not due to variety of cause but depend on the individual [and the site] affected its treatment is that indicated for syphilis. H H S

ESCOBAR (José J) *Contribución al estudio de la Enfermedad Azul de los Chillos* [Blue Disease of the Chillos Indians]—*Med y Cirugia* Bogota. 1940 July Vol. 4 No 11 pp 436-440 442-445 447-448

The condition described with a wealth of detail in this article occurs among the inhabitants of the Chillos Valley in the Andes separated from Quito by the Puengasi hills on the west with the Ilaló hills to the north, the slopes of Pascocha to the south and those of Antisana on the east. The inhabitants among whom the condition occurs are poor very dirty and infested with head and body lice scabies and intestinal parasitosis are common.

The author defines the blue disease as a chronic dermatosis not hereditary characterized by dark deposits in the skin producing zones of bluish pigmentation alternating with hypochromic zones not pruriginous in more advanced areas exfoliation and with ulcers of the mucosa. Later he states that the labial and buccal mucosa also shows the blue patches. Cases are seen in children of three years and in persons of either sex and at all ages above this. Natives and half castes are chiefly attacked but it is seen also in those of white race. It is as stated in the definition not hereditary and is not contagious. The coloration is a dark blue (like mercurialism but rather darker) and the larger areas arise from confluence of those smaller. It is commonest on the exposed parts—face neck arms hands legs and feet—but may affect the trunk. There is no alteration of sensation, tactile thermic and the sense of pain are unaffected. Loss of the eyelashes is common but not alopecia of the scalp or body. Palms and soles are not affected there is widespread glandular enlargement especially in the groin and axilla.

The author finds spirochaetes in the skin lymph (liquido intersticial (linfa) de la piel) after washing with alcohol and rubbing with cotton wool moistened with saline. These are from 7 to 20 μ long and 0.20-0.25 μ broad with eight to 16 turns average 13 not regular like those of *Sp. pallida*. Wassermann Kolmer and Kahn reactions are always positive. Treatment with 0.3-0.45 gm. neosalvarsan is followed by disappearance of the spirochaetes from the skin in 24 hours but does not modify the pigmentation.

The author regards the condition as a spirochaetosis a general and not merely a local condition because of the adenopathy the serological reactions and the widespread involvement of skin and the mucosal symptoms. He describes briefly the histology of the skin affected atrophy of epithelium thickening of the stratum corneum wasting of papillae diminution (escasez) of glands vessels and follicles collagen fibrils abundant and the presence of spirochaetes visible by silver impregnation methods.

The differential diagnosis is made from —

1 Vitiligo because the sites affected differ vitiligo does not invade the mucosa nor is the W.R. positive.

2. Leprosy no modification of sensation no affection of nerve trunks no infiltration and absence of Hansen's bacillus in blue disease.

3 Syphilis. No primary chancre, not a variety of skin lesions, no tertiary signs does not produce abortion, and blue disease subjects may acquire syphilis

4 Carate (pinta) Not varying colours, edges not sharply defined, mucosa affected, spirochaeta said to be thinner longer less motile and more difficult to stain than that of pinta.

[The author does not mention the blue disease known as vagabond's disease due to pediculosis this will not of course explain the mucosa involvement but this is not mentioned in the definition of the disease and the subjects were dirty and verminous. Nor does it explain the presence of the spirochaetes on the skin] H H S

PEÑA CHAVARRÍA (A) & OVARES (Julio C) Un caso de blastomycosis cutánea producida por *Torulopsis wisit* [Cutaneous Blastomycosis due to *Torulopsis wisit* — *Rev. Medica* San José 1941 May Year 7 Vol. 4 No 85 pp 475-480 With 4 figs]

The patient was a white girl, 17 years of age, with various parts of her body showing ulcers of a rupal character (but there were no other signs of syphilis and the W R was negative) She stated that two months before, when she was in excellent health, she was bathing in a rivulet and felt a "prick of a fly" on the left side of her face In 24 hours vesicles appeared on legs and arms which suppurated and discharged a thick yellow pus Crusts formed rugose thick, but not very adherent Examination revealed a yeast-like body which a mycologist cultivated and identified as *Torulopsis wisit*

This was isolated by MAZZA and his colleagues in an Argentine in 1930 The fungus will not grow at 37°C but in three days at ordinary temperature produces colonies slightly raised in the centre of a salmon-pink colour and with irregular borders Treatment with large doses of iodides 1 gm of KI and 2 gm of NaI daily, led to marked amelioration in four days and the ulcers were beginning to cicatrize crusts came away in 10 days leaving pigmented scars, some of them keloid. The multiplicity of the lesions on the white skin produced a condition in which the patient was spotted like a leopard (la piel manchada del leopardo) H H S

MOTTA (Orlando Cabral) Micetoma torácico actinomicótico (Contribuição ao seu estudo clinico) [Actinomycosis of the Thorax.] — *Brasil-Médico* 1942. Feb 28 Vol. 56 No 9 pp 99-102. With 4 figs. English summary

The patient was a child under nine years of age complaining of pain (stitch) in the right hypochondrium with fever 39.9°C cough greenish coloured sputum and shortness of breath Pleurisy was diagnosed a puncture drew off only clear fluid Soon after the temperature rose a little higher and a fresh puncture was made and purulent fluid withdrawn A swelling the size of a mango appeared in the right side of the chest and fistulous openings discharging fetid pus In the pus and the sputum actinomycotic granules were seen Treatment was with potassium iodide starting with one gramme daily and gradually increasing the dose till 4 gm. daily were taken, usually five days in succession, then two days rest During 12 months she took altogether 180 gm. of the iodide and 25.5 gm. of Dagenan. Cure resulted

H H S

DERRY (D. C. L.) CARD (W. I.) & WILSON (Richard) *Histoplasmosis of Darling* Report of a Case With Mycological Note by J. T. DUNCAN—*Lancet* 1942, Feb 21 pp 224-227 With 6 figs. on plate

The case described is that of a soldier who was invalided from France in 1940 because of a persistent cough and fever thought to be due to tuberculosis. Long search failed to reveal tubercle bacilli and finally intracellular yeasts were observed in discharges from a broken-down swelling in the neck and an enlarged inguinal gland. In spite of treatment of an empirical nature the patient deteriorated and died. Post mortem examination revealed a large breaking-down mass behind the liver while in the organs occurred necrotic areas surrounded by cells containing yeasts. Cultures of the yeast yielded mycelial growth. The organism was identified as *Histoplasma capsulatum*. This is the first case of histoplasmosis to be recorded in England, but in view of the increasing number of cases reported from North and Central America it seems probable that the disease may have been overlooked in this country

C. M. Wenyon

HENDERSON (Richard G.) PINKERTON (Henry) & MOORE (Louis T.) *Histoplasma Capsulatum as a Cause of Chronic Ulcerative Enteritis*—*Jl Amer Med Assoc* 1942 Mar 14 Vol 118 No 11 pp 885-889 With 4 figs. [Refs. in footnotes.]

The case recorded is that of a man 70 years of age who was admitted to hospital with persistent diarrhoea which proved fatal three days later. Post mortem examination showed the case to be one of histoplasmosis the pathological feature of which was an ulcerative enteritis. A review of the literature has shown that 8 of 25 thoroughly studied cases had a similar pathological condition of the bowel but that in only two of these was there a history of severe prolonged diarrhoea. There existed in the case described tubercle-like lesions from which parasites appeared to be absent. The involvement of the mesenteric lymph nodes suggests that the gastro-intestinal tract was the portal of entry of the parasites.

In a second case briefly noted diagnosis was established by the discovery of parasites in a lesion on the tongue clinically suggestive of carcinoma.

C. M. Wenyon

VILLELA (E.) & PARA (Madureira) *Histoplasmosis in Child* Case.—*Rev Brasileira de Biologia* Rio de Janeiro 1941 Dec. Vol 1 p 449 [Summary taken from *Jl Amer Med Assoc* 1942, Apr 4 Vol 118 No 14 p 1259]

The case reported by Villela and Madureira Para is the thirteenth in the medical literature the fifth of the disease in a child and the first in Brazil. The disease is probably more frequent than is believed. It may be mistaken for visceral leishmaniasis particularly in regions where that disease is endemic. The disease is fatal. The authors patient a boy aged 3 years lived in unhygienic conditions among dogs and cats. He presented fever and progressive debility for one month. Later there developed diarrhoea with blood in the feces and progressive emaciation. The treatment consisted in administering polyvalent antidyenteric vaccines and vitamins A and D. Jaundice

and red spots over the body appeared one week before death. The diagnosis was made from the microscopic study of the liver which was enlarged, waxy in color and friable. The macroscopic appearance was typical of histoplasmosis. The parenchyma of the liver presented enormous proliferation of reticuloendothelial cells which were engorged with *Histoplasma capsulatum*. The monocyctic cells were also increased and contained histoplasma. Identification of *H. capsulatum* and its differentiation from leishmaniasis in human tissues is best accomplished by the use of Hendenham's iron hematoxylin stain, the Gimsa, Gram and Goodpasture stains and the double impregnation method of Del Rio-Hortega. The rarity of histoplasmosis in Brazil may be seen from the fact that of 188,000 cases in which liver specimens were examined microscopically in the laboratory of the Yellow Fever Service in only one has this blastomycosis been found, while in 131 cases in the same series visceral leishmaniasis was discovered.

MISCELLANEOUS

WEST (E. M. B.) *Tropical Natives. South African Med J.* 1942.
Feb 28 Vol. 16 No. 4 pp 86-89 With 2 charts

Until recently there was a rule which forbade the entry of natives from north of the line Lat. 22°S. into the Union of South Africa for work, but this rule has probably been relaxed. It is feared that depletion of the adult male populations of undeveloped territories may lead to insufficient able bodied adults to prepare new land, and to consequent malnutrition and disease and lowered birth rate so that eventually the labour reserve will disappear. In recent years the Government of Southern Rhodesia has been concerned at the amount and physical state of labourers entering for work, and an investigation has been made at the important point of entry at Victoria Falls. During 1940 3,642 boys from Northern Rhodesia and 2,128 from Angola (Portuguese West Africa) were examined clinically and the average weight for height was charted. At 5 ft. 1 in. the average weight was 10 lb. below the European average; at 5 ft. 11 in. for Northern Rhodesian immigrants it was nearly 30 lb. and for Portuguese West African immigrants nearly 40 lb. below European average. Of these immigrants 1,042 were detained as unfit to proceed, and were given a standard diet of 2 lb. maize meal each day, 2 lb. meat and vegetables each week, with an issue of ground nuts and salt. They were also treated for malaria, hookworm and anaemia as necessary. After one week they showed an average increase of 3 lb. at 5 ft. and of 4 lb. at 5 ft. 11 in. The average weights of boys who had been employed at the mines in Northern Rhodesia for at least 6 months were 20 lb. at 5 ft. and 25 lb. at 5 ft. 11 in. higher than those of the immigrants who had been detained.

In some cases there is no increase in weight after detention, and this is often due to malaria, hookworm infection, schistosomiasis or chest complaints. These immigrants carry to their new surroundings the diseases of the old, and though perhaps themselves immune to severe attacks of malaria, provide reservoirs of infection. The fact that in Southern Rhodesia and Matabeleland an increasing number of streams

are becoming infected with schistosomes provides justification for the assumption that these natives are introducing the disease. Further it is known that disease is spread particularly in conditions of over crowding and it is to the slum quarters of towns that these natives may finally gravitate.

Improvement may be effected by improvement of housing in native quarters of towns and by the control of immigrants to prevent the introduction of disease. Further investigations will probably confirm these findings.

C IV

SOTOLONGO (Federico) & GOLDBERGER (Jacques) Endoscopic Examinations in Cases of Parasitism and Tropical Diseases.—*Rev Med Trop y Parasit* Habana, 1941 Nov-Dec. Vol. 7 No 6 pp 110-119 [22 refs.]

Anal swabs were made with Hall's N I H apparatus the cellophane moistened with 1 per cent sodium chloride. For the study of the minute structure of the intestinal mucosa a special proctosigmoidoscope was employed equipped with an optical and irrigating system—the Deplic-optic proctosigmoidoscope (Goldberger). Vaseline and other lubricants were not employed as they are liable to obscure the microscopic picture but mucilage and glycerine were used as substitutes.

In cases examined with the optical instrument under water irrigation the wash water was collected sedimented and microscopically examined.

Of 108 cases investigated 19 had *Oxyuris vermicularis* 14 *Trichuris trichiura* 6 *Taenia* 4 *Ascaris* 3 *Hymenolepis nana* 15 amoebiasis 2 *Balantidium coli* and 3 sprue.

By the anal swab method with N I H swabs the presence of ova in the anal canal and perianal ridges can be demonstrated in *Oxyuris* *Trichuris* *T. saginata* *Hymenolepis nana* and *Ascaris lumbricoides* infections.

It was surprising to find the proctoscopic picture of *Oxyuris* to consist of haemorrhages and hyperaemia. The parasite itself may be detected in the region of the internal sphincter. In *Trichuris* infection various forms of chronic procto-sigmoiditis were noted and ova were found in swabs from the lesions.

In amoebiasis minute ulcers were characteristic, the larger flask shaped ovoid octagonal or star-shaped the edges being undermined. Zones of elevated hemispherical or ovoid patches are termed perhaps appropriately frog-egg zones. These seem to be covered by a transparent wrapping concealing a mass of yellow-green necrosis. The conversion of these into ulcers can be observed to take place but they may persist unaltered for 10 weeks or longer.

Red pits appear as red poppy-seed spots scattered on the mucosal surface. They are minute cicatrizations surrounded by small haemorrhages.

The parasite cannot be found in the frog-egg zones unless they are ruptured by a biopsy forceps, but when ulcerated *E. histolytica* can be seen in scrapings and swabs. When this fails, administration of cathartics succeeds and cysts can be found in decanted wash water.

In balantidiasis, epithelial lesions of different sizes and shapes are scattered over an intact mucosa.

In sprue the procto-sigmoidoscopic picture in acute cases is characterized by reddish pink granular mucosa.

In chronic cases large sections of the gut bear appearances similar to smoked and boiled bacon there are superficial erosions, and large excoriations, or even small granulations resembling greyish-brown poppy seeds. It is claimed that these lesions distinguish sprue from other forms of steatorrhoea.

P. Manson-Bahr

HERNANDO ORDOÑEZ (J) Sobre el tratamiento de las úlceras crónicas (The Treatment of Chronic Ulcers).—*Med y Cirugia Bogota*. 1941 Mar Vol 5 No 7 pp 294-296-300

Notes, fairly detailed, are given of three cases and brief notes of four others. In one the ulcer was a sequela of erysipelas in another of a burn, others of injuries not specified. The usual forms of treatment such as disinfectants, rest in plaster zinc oxide lanoline and so forth, were tried in vain or if some degree of healing occurred, breaking down followed soon after. The author's method is to rest the limb and apply precipitated yellow oxide of mercury in a strength of 1 per cent in lanolin and vaseline. In the cases mentioned healing took place in 2-3 months and seemed to be permanent. Its use in specific ulceration, e.g. leishmanial, tuberculous, sporotrichosis, is yet to be tested.

H H S

LEWIS (R. R.) A Rapid and Certain Cure for Miliaria Rubra.—*Jl Roy Army Med Corps* 1942 Feb. Vol 78 No 2 pp 86-89.

In this refreshing article the author makes short work of many of the views which have been advanced to determine the cause of prickly heat and states his own opinion [surely correct] that the two principal factors are a hot humid climate and in the unfortunate patient a strong tendency to sweat. The wearing of excessive clothing is also a factor especially in infants but septic foci, over-eating and over-drinking are of little importance. He discusses the clinical signs and the histology of the skin.

In treatment he abandons the advice so commonly given concerning purgation and diet. He insists that clothing must be light and gives a prescription for a dusting powder with which he has had great success.

Zinc oxide	} equal parts
Boric acid	
Starch	
Sulphur sub.	

This is to be dusted over the parts after sponging and drying, and must be frequently repeated. It is especially valuable for infants, and the author has not seen any case which did not immediately respond. The sulphur is an essential ingredient without it the others are useless.

C W

KUHLMAN (J) Een rhinoscleromgeval in West Java. [A Case of Rhinoscleroma in West Java].—*Geneesk Tijdschr v Nederl. Indië* 1941 Dec. 30 Vol. 81 No. 52 pp 2785-2789
English summary (7 lines)

Report of a first case of Rhinoscleroma in West Java (confirmed by bacteriological and histological examination) in a 49 years old male nurse a native of Menado (Isle of Celebes). The pathological tissue

only occurred endonasally and presumably existed 23 years already. The therapy consisted of operative removal of the tumor tissue followed by X-ray treatment with particular precautions against postoperative shrivelling of the lumen nasi by means of rubber tubes. [See also this *Bulletin* 1940 Vol 37 p 383 1942 Vol 39 p 189]

BEACH (M W) & RAVENEL (B O) Tick Paralysis in South Carolina — *South Carolina Med Ass Jl* 1941 Dec. Vol. 37 p 323
[Summary taken from *Jl Amer Med Assoc* 1942 Mar 21 Vol 118 No 12. p 1014]

Beach and Ravenel report an instance of tick paralysis caused by *Dermacentor variabilis*. A child of four became sick the morning prior to admission to the hospital and had weakness general malaise difficulty in arising and a staggering gait. These complaints ceased after an hour and the child played the rest of the day. On the morning of admission the patient had headache and weakness of the lower extremities on walking. The child was hospitalized. Her condition remained about the same until the second day. While combing the patient's hair a nurse discovered a partially engorged tick. The tick was identified as a female *Dermacentor variabilis*. Further search did not reveal more ticks. The child's symptoms cleared rapidly and on discharge twelve days later there was no muscular weakness and only a slight ataxia. The patient was seen two weeks later and she appeared completely recovered.

ROBERTSON (R. Cecil) Thyroid Deficiency The Problem of Endemic Goitre in Yunnan Province.—*Jl Clinical Endocrinology* 1941 Apr Vol 1 No 4 pp 285-292 With 8 figs.

This is a most interesting article and is so full of facts that abstraction is difficult. Endemic goitre in Yunnan is important enough to warrant the formation of an Anti-goitre Association with high officials as members and the Governor of the Province as president. Its functions are (1) To plan and promote anti-goitre measures (2) To arrange systematic and periodic surveys (3) To consider reports of anti-goitre work (4) To maintain a liaison with similar work elsewhere.

Yunnan plateau is above 2,000 metres altitude and in some districts the goitre incidence is as high as 80 per cent but the distribution is somewhat patchy in some villages almost every one of the inhabitants has a goitre. McCarrison noted its prevalence on the Himalayan slopes in regions between 1,500 and 2,000 metres. Also Yunnan water is exceptionally hard (cf Derbyshire throat in the hard water regions of England). People coming to Yunnan from non goitrous districts develop the thyroid enlargement in six months. All along the valley of the Mekong river the incidence is heavy west of Paoshan it is less. Endemicity is greatest in secluded valleys in the Shan States. The author is of opinion that geological formation plays a large part. The grass lands are on a porous limestone soil and soluble substances are rapidly carried away. It is in the upper country where sheep goats horses and cattle are reared that goitre is evident the lower parts are relatively free. Here rice potatoes vegetables and fruits and some wheat are grown.

Chief among the anti-goitre measures prepared by the Association is the addition of potassium iodide 5 mgm. to each kilogramme of domestic salt. The difficulty is to obtain an even distribution of the iodide in

large salt cake masses for it is a measure which must be so simple as to be easily carried out by unskilled workmen. One method is to spray iodide solution into large pans during evaporation with constant stirring. In some of the Yunnan salt works the salt is issued in small cylinders weighing about 2 kgm. For these the dried crystalline salt may be sprayed with iodide solution before the product is compressed into cylinders.

Another measure suggested is the importation of edible seaweed. It has been found that the iodine in seaweeds is 100 times as active as potassium iodide and the *Laminarias* contain more than 0.24 per cent. (the daily need of an individual being between 0.014 and 0.04 mgm.)

Again all school-children and university students are, or are to be supplied with a fortnightly dose of 25 mgm. KI in tablet.

For purposes of survey two forms have been drawn up—one for non-medical observers to determine the actual incidence in a district and the other for medical men to collect information as to hypothyroidism, cretinism, myxoedema, etc. and the relationship to sex, age, water, salt and food. An intensive survey is to be made of seven districts to obtain comparative study of the efficacy of iodization of salt and other preventive measures. It is proposed to examine 70 per cent of the population, which would mean about 223 000 persons. The article is well illustrated. [See also this *Bulletin* 1942 Vol. 39 p. 277]

H H S

GILLET (J. D.) A Larvascope for Use in Identification of Living Culicine Larvae.—*Bull. Entom. Res.* 1942 Apr. Vol. 33 Pt. 1 pp. 27-29. With 1 fig.

Now that it is recognized that yellow fever may be maintained in the jungle by species other than *Aedes aegypti* the rapid identification of Culicine mosquito larvae in the field may be a matter of some practical importance. In this paper a method is described for the identification of the living larvae. They are first placed in a tube completely filled with water so that they are deprived of oxygen for 15 to 30 minutes. After partial asphyxiation in this way the larvae on return to the air will remain stationary for a long time at the surface and they can then be examined with the microscope. For this purpose a cell is prepared by sealing together four microscope slides, the middle pair being cut on one side so as to form a cell 1.5 cm. square. The most satisfactory width for the cell (in order to ensure that the terminal segments and respiratory siphon are seen in side view) was found to be 2.75 mm. The cell is filled with water, the partially asphyxiated larvae are then introduced and examined with the microscope arranged horizontally.

V. B. Wigglesworth

MEAG (Ching-hua) & WIDFIELD (G. F.) Studies on the Control of Fecal-borne Diseases in North China. XIII. An Approach to the Quantitative Study of the House-frequenting Fly Population. A. The Estimation of Trapping Rates.—*Peking Nat. Hist. Bull.* Peking 1941 Vol. 15 Pt. 4 pp. 317-331. With 1 plate. XIV. B. The Characteristics of an Urban Fly Population.—*Ibid.* pp. 333-351. With 5 graphs. [Summary taken from *Rev. Applied Entom.* Ser. B 1942 Apr. Vol. 30 Pt. 4 pp. 62-64.]

The numbers of flies caught in traps of various kinds have often been used to estimate relative density or the effectiveness of control measures,

but the relation between numbers caught and numbers present has not been determined. In the first paper this relation is studied for two types of standard traps the tent trap and the Japanese clock trap. Both are illustrated. The former which is easy to make and is the more efficient consists of a rectangular wire cage which the flies enter by way of a tent-shaped screenway approach extending up from a solid wooden bottom and opening into the trap by a long slot. A bait consisting of bread saturated with a mixture of 2 gm. brown sugar, 4 cc. vinegar and 4 cc. water is placed under the centre of the approach so that to reach it the flies have to enter the area under the wooden floor. The other trap has a small wooden box rotated by clockwork and smeared with a solution of sugar in glycerine. The flies alight on the rotating box and are carried past an usingslass guard which prevents their escape except into a small cage. It was adopted as the standard indoor trap because it is small and objection is not usually made to its presence in a living room.

Information on the composition of the house frequenting fly population of Tsinan as measured by trapping was given in a previous paper. The experiments here described which comprised a preliminary and final series were carried out in a small specially constructed house and covered 1 271 trapping hours during the summer and early autumn in 1936 and 1937. Tests were made without extra food and with garbage or bread sugar and vinegar bait present in the trapping room. A large number of flies was liberated in the room at the beginning of each experiment and the results are expressed as trapping rates which show the mean number of flies caught per hour for each 100 flies present. The trapping rates determined in the two series of experiments were significantly different in only 3 out of 12 cases and in 2 of the 3 the differences were probably caused by improvements introduced in the final series. In view of the fact that the two series were carried out at intervals of a year and each included daily and seasonal changes for the entire summer the degree to which the rates coincided is considered remarkable and it is concluded that the rates show the relation between the mean number caught by a given trap and the number of flies present and that this relation tends to remain reasonably constant from time to time.

The tent trap had a significantly higher trapping rate for *Musca domestica vicina* Macq. than did the clock trap under all three conditions as to food supply. The clock trap had a significantly higher rate for *Chrysomya megacephala* F. than the tent trap in the presence of either garbage or bait and a higher rate in the preliminary tests and a slightly lower one in the final tests with no food in the room. The tent trap rates for *Muscina stabulans* Fall. the genus *Sarcophaga* *Lucilia sericata* Mg. and the group of miscellaneous species were all significantly higher than the clock trap rates when no food was present but in the presence of garbage or bait the rates did not differ significantly except in the case of the miscellaneous flies in the presence of bait which were more numerous in the tent trap. The rates for *Musca domestica vicina* were significantly reduced for both traps when either garbage or bait was available in the room. The tent trap rates for the other species the miscellaneous group excepted were all significantly reduced by the presence of these foods but the clock trap rates were unaffected. The bearing of the habits of the various species on the rates for the different conditions and traps is discussed. The fundamental difference in the behaviour of indoor and

outdoor species suggests that the trapping rates for the latter in the experiments which were necessarily carried out in an enclosure may be too low when applied to outdoor stations. Comparative trapping rates for *M. d. vicina* and *C. megacephala* for the two kinds of traps under the three conditions of food supply in both series of experiments are shown in a table. The tent trap rate for the former was significantly higher than that for the latter under all conditions, probably on account of the reluctance of the outdoor species to enter gloomy areas, but a significant difference was only once obtained in the clock trap—this was in the final series with no food when more of *M. d. vicina* were taken. Under all the other conditions, the rate for *Chrysomya* was slightly the higher.

In conclusion, a table is given showing theoretical trapping rates for the various flies in each trap in the presence or absence of food (garbage or bait). These rates are based on the experiments, with greater weight given to the final series. They have been used in calculating the fly density indices that will be given in the following papers of the series.

The technique used and results obtained when the method described above was applied to the study of the fly population of Tanan in 1938 are recorded in the second paper. Trapping was carried out from June at indoor stations and April at outdoor ones to the end of December. The tent trap was used at outdoor stations and the clock trap at the indoor ones. The numbers of trapping hours of flies caught and of flies identified at indoor and outdoor stations and at the faeces disposal ground (which is considered separately from the other outdoor stations) and the percentage of the various species are given in a table. *M. d. vicina* formed 52.09 per cent of the total identified catch and 96.32, 29.12 and 59.30 per cent of the catches at the indoor and outdoor stations and the disposal ground respectively. The corresponding figures for *C. megacephala* were 18.31, 2.30, 41.13 and 5.73. Another table shows the general and specific fly density indices or estimates of the populations present calculated from the trapping rates as described in the first paper and the percentages belonging to each species as calculated from the indices (corrected percentages). The three indoor stations with the highest general density indices all had especially attractive food supplies. The densities in the remaining ones indicated that flies breed more in the villages than in the city. Indices for *M. d. vicina* closely followed the general ones. The general index in the indoor stations was 57.7 and the specific indices for *M. d. vicina* and *C. megacephala* were 64.7 and 2.2, the corrected percentages for these two species being 94.7 and 3.81. The highest general density indices outdoors were at a garbage bin and the disposal ground where specially attractive conditions prevailed. The other stations showed the same trend as the indoor ones. The general index at the outdoor stations, excluding the disposal ground was 532.6 and the indices for *M. d. vicina* and *C. megacephala* were 68.1 and 363.5 the corrected percentages being 12.6 and 68.2. At the only outdoor station within the city and at the disposal ground, *M. d. vicina* was more numerous than *C. megacephala*. The group comprising species other than these two showed greater densities outdoors than indoors, where it was almost negligible. Detailed comparisons of populations in the different stations and districts are made in a further table, and monthly variations are shown in tables and figures. *M. d. vicina* dominated the indoor fly population throughout the trapping period and its greatest density occurred in

July *C. megacephala* was taken in less than half of the outdoor stations in June and July its numbers rose rapidly in August were greatest in September and dropped sharply in October and November when the last individuals were taken. The findings in an indoor control station in which all flies (1 831) were caught and identified are shown in a table. They corroborated conclusions concerning other indoor stations, 91.77 per cent of the flies being *M. d. vicina*.

CROSS (J. C.) A Simple Method of controlling Termites — *Science*, 1942, April 24 p. 433 [Summary appears also in *Bulletin of Hygiene*]

Termites cause much damage and even destruction of buildings in the tropics. The author speaks of a method simple and cheap which, if effectual elsewhere as well as in Texas, will be indeed a godsend. The aim is to prevent their entrance while the building is under construction [care being taken of course not to use any infested wood however light the infestation]. Wherever the building touches the ground a small ditch is made and discarded motor oil (or any crude oil) poured in. In an experimental house with 56 concrete piers in the foundation this was done except in one place which was overlooked. Termites entered there but nowhere else. They were killed with chloroform fumes and the place duly oiled. This was four years ago and though the soil outside is heavily infested no termites have entered. The oil stays long in the ground and does not spread more than a few inches and so has no deleterious action on adjacent shrubbery.

H. H. S.

SCOTT (R. R.) The Medical Training of Africans in Tanganyika Territory — *South African Med. J.* 1942, Feb. 28, Vol. 18, No. 4, pp. 83-86.

SPECIAL RESEARCH SECTION

LEWIS (E. Aneurin) Interim Report on Experiments to control *Glossina pallidipes* in the Lambwe Valley, South Kavirondo, Kenya Colony — 11 mimeographed pp. With 1 map & 6 figs. 1941 Aug. 5. Kabete.

This interim report describes the methods and results obtained in experiments to control the tsetse fly *Glossina pallidipes* by trapping and without complete clearing of bush. The Lambwe Valley is about 24 miles long and averages four miles in width. It was formerly well populated but following an outbreak of sickness among livestock from 1908 onwards the valley has become almost completely uninhabited. It was infested with *G. pallidipes* throughout the riverine bush and the smaller subsidiary valleys. The results show that this species of tsetse-fly can be controlled without clearing all the bush but some clearing in the preferred habitats is necessary. Traps and teams of fly boys with screens and nets will reduce the population and if isolation from sources of re-infestation is secured, reduction is much more rapid. The destruction of undergrowth alone in a narrow strip does not prevent dispersal but a strip a thousand yards in width

completely devoid of bush and trees is efficient in protecting an isolated area from reinfestation. Thinning out the thickets adjoining a protective barrier still further reduces the tendency to cross the open space. An extension of this form of discriminative clearing will produce a concentration of the tsetse-fly, which may then be attacked by extensive trapping and patrols. In the Lambwe Valley the breeding of *G. pallidipes* is restricted to the riverine bush. Its eradication from this habitat releases large areas of the adjoining country for profitable agriculture. Experiments were made with many designs of tsetse-fly traps—those which gave promising results were Harris's, Swynnerton's single screen type with awnings and buttocks, Blunt's box screen, and Langridge's collapsible trap. To obtain a relatively quick result numerous traps are required and these need frequent repair and renewal. The subject of traps and trapping will be more fully dealt with in a later paper. Here the author records that a trap catches more *G. pallidipes* when it is new than after it has been exposed for some time. The numbers increase again if the old trap is replaced by a new one, and traps bleached in the sun before setting in an infested area do not show this large initial catch. It is extremely doubtful if traps will effect the extermination of residual small numbers of flies. The selection and preparation of good sites for traps require expert advice, based on accurate information from local surveys. When the infestation is naturally low, or has been reduced to a low density, other measures, such as hand-catching by boys with beaman screens, are necessary. The author emphasizes that the permanent haunts of *G. pallidipes* are usually far smaller than the area which is rendered uninhabitable to stock by periodic dispersal of the flies. There is, moreover, a constant danger of permanent extension of the fly belt, so that even where actual reclamation cannot be undertaken, protective measures, such as the establishment of well-made barrier clearings, will at least prevent the invasion of more territory. There are also natural conditions, such as severe drought, heavy rain and floods, which periodically affect the fly adversely. Advantage may be taken of these to initiate control measures and so gain a large advantage at low cost. I. B. Wigglesworth.

TROPICAL DISEASES
BULLETIN

Vol 39]

1942

[No 10

SUMMARY OF RECENT ABSTRACTS *

VIII TYPHUS GROUP OF FEVERS

Proteus OXY19 type Vectors louse and flea

Louse-borne—Epidemic louse-borne typhus follows war famine mass movements of population and disturbances of political stability. It is spreading during the present war and the following table (extracted from the fuller table given in *Public Health Reports* Washington 1942 Vol 57 No 17 pp 638-9 No 18 pp 682-3) will serve to demonstrate the severity of the outbreak in Europe and North Africa. No doubt the actual position is worse than the figures indicate and it is clear that the tendency is markedly towards increase

Cases of Typhus

	1941	1942 (to the end of March)
Algeria	12,827	11 622
Egypt	9 324	4 092
Morocco	1 471	9 179
Tunisia	7 078	6 432
Germany	2,158	85 (one week only)
Hungary	652	358
Poland	3 786	2,068
Rumania	1 827	2 943
Spain	9 560	

MOROZKIN (p 440) refers to the indistinct appearance of the rash in some cases of typhus especially in children. An abortive form of the disease in which the fever lasts about nine days has been found in

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

2.1 per cent. of cases. GROMACHEWSKI and MOROZKIN (p. 441) note that the average febrile period in Russia is 14.4 and 14.9 days for winter and summer respectively. They deny that there is any seasonal difference in the character of the disease. RUGG and SCHILLING (p. 189) discuss the possibility that typhus may occur in the absence of a rash. There is fairly general agreement that in a small proportion of cases there may be no rash or that it may be difficult to detect. [See also DOWDS below]

BORRA (p. 200) gives a clinical description of typhus as it is seen in Ethiopia. D'IGNAZIO *et al* (p. 200) have studied the cerebrospinal fluid in typhus. It is under increased pressure but remains clear except in severe cases, when there may be a high polymorphonuclear content of blood. SALGIVANYI (p. 201) and GUERRA (p. 201) give accounts of the changes found in the auditory and the visual apparatus respectively in typhus.

CASTAFEDA *et al* (p. 448) describe their technique for preparing the antigen of *Proteus O\19* for the agglutination test which, with the aid of methylene blue can be carried out with whole blood at the bedside. They point out however that agglutinin against *R. prowazeki* appear earlier than those against *Proteus O\19* and that agglutination of *Rickettsiae* can readily be detected by means of the microscope.

LIU *et al* (p. 681) state that in normal mice *R. prowazeki* gives only a apparent infection which dies out after three passages. If however mice are irradiated and then given considerable doses of the *Rickettsiae* by the abdominal route all become infected and die. *Rickettsiae* are numerous in peritoneal exudate and various organs. Mice may thus be used in experimental work and in preparation of vaccines. [This recalls Zisser and Castafeda's method of preparing murine vaccine see this Bulletin 1933 Vol 30 p. 887 1939 Vol 36 p. 1002.]

Flea-borne.—SILVA and OCHOA (p. 682) have isolated a murine strain from rats at Zacateco Mexico; they point out that in the high plateaux of Mexico as in Shanghai infection of murine origin is spread from man to man by lice.

A form of typhus exists at Pinar del Rio, Cuba, which according to LIDA YANEZ (p. 203) is probably of murine origin. In support of this view is the fact that CURBELO *et al* (p. 442) have identified *Rickettsiae* of the murine type in a rat in Pinar del Rio; they also regard the human disease seen in this area as of the same kind.

MELNEY (p. 681) refers to the recent increase in typhus [of the murine type] in the Southern United States. Larger numbers of cases have been found in the cities in which it was originally discovered, and extension has taken place to other cities, towns and rural areas.

DOWDS (p. 442) reports a number of cases of mild typhus in native labourers on the copper mines in A. Rhodesia. In no case could a rash be detected. [It will be remembered that SCAFFIDI (this Bulletin 1939 Vol 36 p. 889) pointed out that in black skins the rash of louse-borne typhus shows variations in intensity and may be no more than a draught macular exanthem.] *Proteus O\19* was usually agglutinated in high titres and inoculation of blood produced fever and scrotaal lesions in guinea-pigs. There was no history of tick bite and the evidence points to typhus of murine origin. *Rats* were abundant in the men's huts.

BHATIA (p 442) reports a case of typhus probably of murine origin from Lucknow

LEIMENA (p 685) notes that although mite-borne typhus is prevalent in Sumatra flea borne typhus of murine origin (shop typhus) is more common in Java

ASANO (p 442) reports a number of cases of typhus presumably of murine origin in the neighbourhood of Okayama

HARALSON (p 441) notes a marked increase of typhus in the Hawaiian islands during 1940

Liu *et al* (p 202) note that the production of orchitis in guinea pigs is not a certain criterion for the diagnosis of strains of murine typhus Rickettsiae since there are murine types virulent for rats and mice which do not produce orchitis in guinea pigs. In Peiping strains have been found in man which are non-orchitic but which are virulent to rats. From a consideration of the whole matter the authors incline to the view that the strains from man which they have tested are all of murine type. It seems probable however that louse borne disease occurs in Peiping but it is not yet clear whether this form is of murine origin or is true epidemic typhus

NAUCK and ZUMPT (p 443) have confirmed previous work which indicated that *Cimex lectularius* is of no importance in the transmission of murine typhus

HUDSON (p 448) describes an agglutination test against emulsions of Rickettsiae from the infected lungs of rats and mice. Clear-cut results were given with sera from patients with typhus [presumably of murine origin] in high dilution. BENTSON (p 682) writes of a complement fixation test in which the antigen was a suspension of murine Rickettsiae from infected mouse lung or fowl embryo. Complement fixation was obtained with sera from patients infected from seven days to nine years before but could not be obtained with sera from cases of Rocky Mountain or Q fever. The reaction appears therefore to be specific.

Proteus OXA type Vector mite

While maintaining a distinction in nomenclature between mite fever and tropical scrub typhus VAN DER SCHROEFF (p 684) contends that they are in fact the same disease in Sumatra. A primary sore may appear in either and an explanation offered by some observers [who believe that the disease is transmitted by ticks as well as by mites] is that the mite pierces the superficial layers of the skin only so that the infecting agent causes necrosis of the skin and ulceration whereas the tick penetrates to the subcutaneous tissue and no necrosis occurs [that this is not true of all tick borne typhus infections is shown by the fact that a primary sore is a typical part of the syndrome of bouton neuse fever]

LEIMENA (p 685) describes a case of scrub (mite-borne) typhus in Bandoeng Java. This is the second to be described from this district

GUNTHER (p 445) has investigated the endemic typhus of New Guinea which is practically confined to adult males working in bush (111)

country or in newly cleared areas. He has not seen this disease in the natives of the country. It resembles tsutsugamushi, the Weil-Felix reaction is positive to *Proteus* OXK and the author concludes, on the evidence of a careful survey of mites that it is transmitted by *Trombicula minor* and that the reservoir is the bandicoot. [The name endemic typhus is misleading—it is commonly applied to typhus of murine origin in other countries. LEWISWHITE and SALOON (this Bulletin 1940 Vol. 37 pp 576-84) have shown that tsutsugamushi, scrub typhus of Malaya, and Sumatran mite fever are identical. There can be little doubt that this New Guinea disease falls into the same group. MAY (p 685) describes two cases of fever in Europeans in Papua. This was undoubtedly fever of the tsutsugamushi type with Weil-Felix reaction positive to *Proteus* OXA. It is thought that this disease has probably long existed in the natives.]

HEASLIP (p 445) gives an account of tsutsugamushi in Northern Queensland—the symptoms are those of tsutsugamushi as seen elsewhere and the Weil-Felix reaction is positive with *Proteus* OXK. Diagnosis may be made by inoculating blood, taken during the fever into mice—a positive result is indicated by pleural and peritoneal effusion with enlargement of the spleen and death in about 10 days. Natural infection was found in rats and bandicoots of the scrub country and swampy areas. On these animals larvae of *Trombicula discors* were found in large number and this mite is probably responsible for transmission as it is in the East Indies. The same author (p 451) calls attention to the differentiation of the mite-borne typhus of N. Queensland from the so-called Coastal fever of the same area. Blood from cases of Coastal fever does not give the same result in mice as that from typhus. As this disease is thought to be due to a Pasteurella-like bacillus it is not included in the typhus group but gives trouble in differential diagnosis.

KORWEDAR and ESTEYELD (p 686) in Sumatra note that most strains of mite-borne typhus fail to produce fever in guineapigs. One strain, however, does so and in work with this strain the authors have reached the following conclusions—Guineapigs, after this infection remain immune for at least 13 months—convalescent serum from man or guineapig fails to protect however employed—serum has only slight effect in attenuation of virus when the two are left in contact before injection.

RUTTES (p 680) reports that sera from patients with mite-borne typhus showed a distinct tendency to become positive to the Kahn test as the disease progressed.

Indeterminate type Vector tick

ALEXANDER, MASON and WEITZ (p 203) in South Africa have carried out important researches on four strains of tick-borne Rickettsiae (one from a dog, one from *H. abnormis agrippae*, one from a case of tick-bite fever and one from *Khipicephalus arizonensis* sent from Tunis) and have compared these strains with a strain of South African murine Rickettsia. The four strains are classed as Group I—the murine strain as Group II. There was great similarity between the strains of Group I but strong dissimilarity between Group I and Group II. These characters may be set out, for clarity, in tabular form—

	Group I	Group II
Smears from exudate of guineapig testes	Rickettsiae few scattered in cytoplasm of monocytes and serosal cells	Rickettsiae in masses and clumps polymorphic.
Smears from egg cultures	Rickettsiae relatively few in cells but with numerous intranuclear forms	Rickettsiae in masses in cytoplasm of cells never intranuclear
Infectivity to guineapigs.	Large doses required not readily passed scrotal reaction present if large doses employed.	Infection easily produced almost constant scrotal reaction
Infectivity to white rats	Poor in general	Rats easily infected
Weil Felix with <i>Proteus OX19</i> in rabbits.	Only 1 of 10 positive in low dilution	10 of 10 positive
Cross protection tests.	Protection within the group marked no protection against Group I	Protects against itself and also against Group I

These experiments show that the Rickettsiae of African tick-bite fever and of boutonneuse fever are immunologically related, but are distinct from the Rickettsiae of murine typhus. Group I belongs to the Rocky Mountain fever group Group II to the typhus fever group

FINLAYSON *et al* (p 205) point out that little is known of the vector of tick bite fever in South Africa. They have isolated a strain of Rickettsia from a batch of *Hyalomma aegyptium* collected from a cow. This produces scrotal reaction in guineapigs inapparent infection of rats and mice fails to produce agglutinins for any strain of *Proteus* on injection into rabbits and does not protect against murine or louse-borne typhus though animals inoculated with murine or louse-borne strains are protected against this tick borne strain. They consider that their strain is probably that of tick-bite fever though there are points of similarity with that of Q fever [The close correspondence between these findings and those of ALEXANDER *et al* (above) is strong confirmation of the authors' view that their strain is that of tick-bite fever. It is however time that a better name be given to this disease tick borne typhus would be preferable]

CAMPBELL and KETCHUM (p 206) could not detect any characteristics which would serve to differentiate clinically the Western from the Eastern type of Rocky Mountain fever in a few cases observed. Furthermore they state that the fatality rates of the two varieties calculated from a large series of cases recorded in the literature were approximately equal 19.4 per cent. for Western and 18.1 per cent. for Eastern cases. [It will be remembered that great differences in fatality rates have in the past been reported from the Western States—82 to 90 per cent. in Montana about 5 per cent. in Idaho—and that strains

of Rickettsiae isolated from Eastern cases have usually been less virulent for guinea pigs than those derived from Montana. Exceptions have occurred, however, and a fully virulent strain was reported from Washington, see this *Bulletin* 1940 Vol. 37 p 843. BRIGHAM and WATT (p. 632) note that, in general, the strains of Rocky Mountain fever Rickettsiae from Montana and the West are more virulent than those found in the Eastern United States and produce scrotal lesions and high death-rate in guinea pigs after a short incubation period. These criteria have been used to distinguish the two strains. The authors now report however that two highly virulent strains have been recovered from dog ticks (*Dermacentor variabilis*) in Georgia, and that the typical scrotal reaction was produced in guinea pigs by one of these strains. They describe the scrotal reaction in detail. They recall that a severe case of Rocky Mountain fever similar to those commonly found in the West has been described in a patient in the East.

HASSIN (p. 683) describes the cerebral changes in a case of Rocky Mountain fever which are those of non-suppurative meningo-encephalitis. They are analogous to those found in typhus fever.

MAIL (p. 205) gives an account of measures which may be taken against *Dermacentor andersoni* in North America. This tick which is associated with the spread of Rocky Mountain fever is found on livestock and rodents and is the tick which most commonly attacks man.

DE MAGALHÃES and MOREIRA (p. 443) describe a fulminating form of typhus found in Minas Gerais in which there may be no prodromata or rash and which may lead to death so sudden that there may be suspicion of foul play. No information as to the form of typhus is given, but the usual type in Minas Gerais is tick borne the virus being identical with that of Rocky Mountain ported fever (see this *Bulletin* 1940 Vol. 37 p 574). DE MAGALHÃES (p. 444) describes a case of mapparent infection in Minas Gerais and notes that in the same house was a dog whose blood was infective to guinea pigs though the dog itself was apparently healthy. With PERALTA the same author describes the electro-cardiograph findings in this disease.

DE MAGALHÃES (p. 444) mentions animal re-errors of the tick-borne typhus of Minas Gerais — the dog, two species of opossum, the fox, the rabbit-like coati, and the bush rabbit. He has found that the wild cat *Felis tigris* can be infected experimentally.

LUDLAM *et al* (p. 683) describe a case of fever in a docker at a Scottish port who had been unloading hides from South America. The serum was positive to *Proteus OX2* but negative to *OX19* and *OXA*. The blood did not produce infection in guinea pigs. On the whole this appears to have been a case of tick-borne typhus similar to that found in S. Paulo and it is suggested that infection was acquired from ticks in the hides or infecting the ship's rats.

Vaccination

LIU and ZIA (p. 207) have used a Weigl vaccine and a tissue culture vaccine in China, with apparently successful results in creating a positive Weil-Felix response or of increasing an already positive reaction. TCHANG and MARROW (p. 450) prepare vaccines from cultures of the Chinese strain of *R. prowazekii* in developing fowl embryos.

these are standardized to the equivalent of the content of 100 infected louse intestines and have been used in man. In guinea-pigs one-tenth of this dose produces solid immunity.

DURAND and GIROUD (p 686) write of their method of preparing vaccines of *R. prowazeki* by infecting rabbits by the intratracheal route and obtaining suspensions from the lungs. Protection afforded to guinea-pigs is high and in man there is a satisfactory production of positive Weil-Felix reaction. CASTAÑEDA (p 687) shows that vaccine of Rickettsiae of murine origin prepared from infected rat lung will protect against epidemic typhus though only if larger doses than of a comparable epidemic strain are used. It is not yet possible to say if there are antigenic differences between the two strains but even if there are they are apparently not great enough to justify disregard of the immunizing power of murine strains against epidemic disease.

FINLAYSON and GROBLER (p 687) have used in South Africa a vaccine (of epidemic typhus Rickettsiae) prepared by the Zinsser-Castañeda technique from the peritoneal exudate of irradiated infected rats. A single dose does not protect so well as three doses but alum-treated vaccine will protect 80 per cent of experimental animals and it is thought that the use of such a vaccine may help to overcome the difficulty of persuading African natives to return for successive doses.

KUROCHKIN and WYCKOFF (p 451) have obtained good protection in tests of Rickettsiae of Rocky Mountain fever and of louse-borne typhus grown on agar (Zinsser's method) or cultivated according to Cox's method in the yolk sac of the fowl embryo. PARKER (p 688) reviews the results obtained from the use of a killed vaccine against Rocky Mountain fever prepared from the tissues of infected ticks (*D. andersoni*) and employed in Montana and Idaho. This vaccine gives high protection against death but little against attack in areas of highly virulent infection such as western Montana. In Idaho however where case mortality is low the vaccine gives almost complete protection against attack. Vaccination in two or more successive years increases protection and vaccination within a day or two after tick bite may modify the attack in areas where infection is usually mild. The only condition in which vaccination is not recommended is when a bite by a suspected tick has already occurred in areas of highly virulent infection.

SINGER (p 679) reports attempts to cultivate Rickettsiae in cell free media. Limited success was obtained.

Q fever

The epizootology of Q fever is becoming clearer. FREEMAN *et al* (p 208) have used the agglutination of *Rickettsia burneti* in a survey of animals in Queensland: agglutinins are present in the serum for several months after an attack and even in cases where the fever has been inapparent. This test indicates that the bandicoot *Isodon macrourus* is important in the natural spread of the disease: it is heavily infested with the tick *Haemaphysalis humerosa*. Agglutinins have also been found in rats and in one cow. In man there were a number of positive results with sera from abattoir workers in Brisbane but it is thought that *H. humerosa* does not readily attack man. The potential hosts of Q fever in Queensland are numerous. DERRICK *et al* (p 447) have

found seven rodents and two marsupials to be susceptible to experimental inoculation of the Rickettsia though the infections produced were all either mild or inapparent. The names of the animals are given in the abstract.

DAVIS (p. 688) has shown that the Rickettsia of American Q fever (*R. disporica*) is not transmitted to guinea-pigs by *Ornithodoros turicata* during the act of feeding. The faeces of the infected ticks are infective however and the tissues of the ticks may remain infective for 1001 days after the infective feed. The virulence of *R. disporica* is not affected by long residence in the tick or by prolonged fasting of the tick. The infection is not transmitted hereditarily in the tick. SMITH (p. 690) has found *Rhipicephalus sanguineus* to be a potential vector of Q fever in Queensland. The tissues and faeces are infective but the infection is not transmitted hereditarily.

BENGTSON (p. 446) notes that the evidence obtained from serological and cross-immunity tests indicates that the Rickettsiae of the American (*A*) and the Australian (*Q*) strains are identical. The American strain is apparently slightly more virulent but this difference is no greater than that found between the strains of Rocky Mountain fever Rickettsiae. BURNET and FREEMAN (p. 688) in Australia have confirmed the finding that the American and Australian strains of the Rickettsia of Q fever are immunologically identical though the American strain with which they worked was considerably more virulent than the Australian strain for guinea-pigs. They note that Rickettsiae killed or inactivated by formalin or heat produce on injection substantial immunity in guinea-pigs.

BURNET and FREEMAN (p. 689) have infected egg membranes with *R. burneti* and note that the changes produced are similar to those which occur in virus infections. The virulence of the infection for guinea-pigs is much increased after culture in egg membrane as is the virulence of the Rocky Mountain fever Rickettsia in the tick. The explanation suggested for these increases in virulence is that in neither case are antibodies produced, whereas in infected animals antibodies are found.

HORSBROOK *et al.* (p. 691) describe an outbreak of Q fever in the National Institute of Health, Washington where strains of the Rickettsia were being studied. It is not clear how the outbreak originated but it is thought that the infection may have been dust borne. Clinically the characteristic feature was patchy pneumonitis detected by X-ray but giving rise to few physical signs. LILLIE *et al.* (p. 446) give an account of the pathological changes seen in human pneumonitis in Q fever and note that these are essentially the same as those which occur in monkeys infected by the intrapulmonary route. Rickettsiae however were not seen either in the human or animal material. Similar patchy pneumonitis was found in a patient who contracted the disease naturally in Montana. There was no evidence of tick bite but there was a rising titre of agglutinins for *R. disporica*. HENDSOMER and DUFFALO (p. 691) consider that the disease is probably more widespread than is at present known.

BENGTSON (p. 690) reports that a complement fixation test for Q fever in which the antigen is obtained from yolk sac cultures is a valuable diagnostic measure. She (p. 690) notes that in Q fever the processes of active and passive immunity follow the same general laws as those which apply in bacterial infections. Active immunity can be

induced by the injection of killed Rickettsiae and hyper immune serum can be prepared by this procedure followed by the injection of living organisms.

Charles Wilcocks

MALARIA

SIVALINGHAM (V) & RUSTOMJEE (K J) Spleen and Parasite Surveys in Ceylon.—*Jl Malaria Inst of India* 1941 Dec. Vol. 4 No 2 pp 155-173 With 7 maps [19 refs]

The spleen and parasite surveys reported were carried out in February and March 1938 and 1939. Schoolboys aged 5 to 14 were the subject of the surveys 144,873 in 1938 and 148,504 in 1939. Blood films from 10 per cent of the boys were examined from 33 per cent in some areas with scanty populations in 1939.

Ceylon may be divided into three zones according to the rainfall during the period of the south west monsoon. The dry zone with less than 20 inches of rain comprises the northern and eastern halves of the island. The wet zone is the south west corner of the island here the south west monsoon rainfall exceeds 40 inches. The intermediate zone a narrow arc-shaped strip plentifully provided with mountains and rivers separates the wet from the dry zone its monsoon rainfall varies from 20 to 40 inches. Nearly all the hyperendemic malaria areas of Ceylon are in the dry zone. There is least endemic malaria in the wet zone. Spleen rates in the intermediate zone are subject to the greatest fluctuations. Spleen rates may be high in the intermediate and wet zones immediately after an epidemic of malaria thereafter they diminish progressively usually for four or five years at which intervals epidemics are apt to recur. Most of the dry zone had spleen rates of from 40 to 60 per cent most of the wet zone of from 0 to 10 per cent.

In 1939 films examined in the dry zone numbered 9,765 parasites were found in 698 *P. malariae* 55 per cent *P. falciparum* 26 per cent *P. vivax* 19 per cent. In the intermediate zone 5,955 films were examined parasites found in 295 *P. malariae* 52 per cent *P. falciparum* 29 per cent *P. vivax* 19 per cent. In the wet zone parasites were found in 118 out of 5,970 films *P. malariae* 30 per cent *P. falciparum* 33 per cent *P. vivax* 37 per cent.

Norman White

HÜBNE (Wolfgang) Die Malaria in Westafrika [*Malaria in West Africa*].—*Deut Trop Ztschr* 1942 Jan 1 & 15 Vol. 46 Nos 1 & 2 pp 3-18 33-48 [39 refs]

These papers contain brief notes on malaria in Mauretania Senegambia Portuguese Guinea French Guinea, Sierra Leone Liberia Ivory Coast Gold Coast Togo Dahomey Nigeria the Cameroons Gabon and the Belgian Congo. No new work is reported. The common vectors the common parasites and the geographical distribution of infection are briefly mentioned.

C IV

ROZEBOOM (L. E.) & LAIRD (R. L.) *Anopheles (kerteszi) bellator* Dyar and Knab as a Vector of Malaria in Trinidad, British West Indies.—*Amer J Trop Med* 1942 Jan. Vol. 22 No. 1 pp 83-91

In 1930 a malaria survey of Trinidad disclosed the fact that the two important vectors of malaria in the Island are *A. bellator* and *A. tritaeniorhynchus*. The present paper affords additional evidence that *A. bellator* is a dangerous vector the control of which will be costly. Its control is a matter of importance to United States military forces. Observations were mainly restricted to two small communities in a highly malarious cocoa-growing district.

Four species of *Anopheles* were found. *A. bellator*, *A. ornaldos*, *A. punctulatus* and *A. similis*. Of 5734 adult anophelines captured 5495 were *A. bellator*. *A. bellator* breeds exclusively in collections of water at the base of leaves of bromeliads which extensively parasitize *immortelle* trees which abound as shade trees on cocoa estates. Four species of Bromeliaceae capable of holding water are abundant. They are *Tillandsia*, *Lechmania*, *Grassia* and *Wittmackia*. Larvae of *A. bellator* were found in only two *Grassia* and *Wittmackia*. *Grassia* is by far the more important. Two dozen larvae or more are often found in the water in a single plant. A total of 409 larvae and pupae were collected from 120 *Grassia*.

In jungle shade female *A. bellator* will attack early in the afternoon, but the real flight begins at about 5.30 p.m. and continues some two hours during which very large numbers can be trapped. It prefers human to animal blood. Activity is much less pronounced in the early morning than in the evening. It attacks man variously out of doors and indoors preferably the former. It will enter houses in search of human blood after feeding, the females return immediately to their jungle resting places.

Experimental infections of *A. bellator* were obtained on two occasions. Three of 25 wild *A. bellator* were found to be naturally infected. Norman White

ENGINEERING NEWS-RECORD 1941 Sept. 11 Vol. 127 p 340—
New Malaria Mosquito found at Trinidad Base. Summary taken from *Public Health Engineering Abstr* Washington. 1941 Dec. Vol. 21 No. 12 p 16. Signed W. A. REIDMAN.

U.S. Army Medical Officers have discovered that the mosquito *Anopheles bellator* can transmit malaria. This mosquito breeds in air plants which grow in the top of trees that provide the necessary shade for the production of cocoa. Among the methods of control being considered is the removal of the air plants, which hold rainwater necessary for breeding from the trees or cutting down the trees. This latter method might endanger the production of cocoa. [See ROZEBOOM and LAIRD above]

SEN (P.) On the Microsporidia Infesting Some Anophelines of India.—*Jl Malaria Inst of India* 1941 Dec Vol. 4 No. 2 pp 25-261 With 19 figs on 1 plate

An examination of anopheline larvae in the neighbourhood of Calcutta has shown that those of at least six species are liable to

microsporidial infection Three species of microsporidia—*Thelohania legeri* *T indica* and *T anomala* n sp were concerned in the infections.

C M Wenyon

KOPP (Israel) & SOLOMON (Harry C) **The Relationship of Hypoalbuminemia to the Edema of Malaria.**—*Amer Jl Med Sci* 1941 Dec. Vol 202 No 6 pp 861-868 With 2 charts. [16 refs]

Oedema is of frequent occurrence in patients undergoing therapeutic malaria. It is commonly regarded as of cardiac origin this the authors consider unlikely A reduction in the plasma proteins especially albumen might account for it this would change the osmotic pressure and affect the interchange of fluid between blood and tissues. To test this hypothesis observations were carried out on seven patients undergoing malaria therapy for general paralysis they had no other complicating diseases These patients each had from 10 to 13 paroxysms of malaria the malaria was terminated by the administration of quinine Three of the patients developed clinical oedema The observations led to the following conclusions —

1 Marked disturbances with a reduction of the plasma proteins occur in malarial fever Albumin values fall progressively to critical levels at which edema may occur Globulin as a rule shows a progressive increase after the first few paroxysms reaching its highest level at a time when albumin values are about lowest. Fibrinogen values fluctuate considerably and in 3 of 7 patients were reduced below pre-febrile levels.

2. The termination of malarial fever is followed by an immediate and continued rise of albumin and a delayed but progressive drop of globulin from its highest level so that normal values are obtained in from 10 to 24 days. Fibrinogen values return to normal within 1 week's time

3 The albumin-globulin ratio falls rapidly during malaria reaching levels of 1 or below after 10 to 12 paroxysms have occurred.

4 The dependent or generalized edema occurring during the course of therapeutic malaria in patients free from renal damage or cardiac failure is the result of a reduced osmotic pressure caused by a marked fall of the albumin fraction to levels of 3 gm per 100 cc or below

Norman White

BURNEY (L. E) MAYS (J. R. S) & ISKRANT (A. P) **Results of Serologic Tests for Syphilis in Non-Syphilitic Persons Inoculated with Malaria.**—*Amer Jl Public Health* 1942 Jan Vol. 32 No 1 pp 39-47 With 1 chart [12 refs] [Summary appears also in *Bulletin of Hygiene*]

The question whether or not malaria has any effect on serum reactions for syphilis is important for many reasons particularly because of the serological surveys of populations of malarious districts to discover the prevalence of syphilis amongst them The authors of the present paper quote a number of opposing opinions on this subject and criticize previous work on the grounds of most having been carried out on patients in whom syphilis could not be entirely ruled out. Also many of the opinions to the effect that malaria does not cause the Wassermann reaction to become positive in the absence of syphilis are based on tests at a time when methods were not so sensitive as at present

KITCHEN *et al* [*Bull of Hyg* 1939 Vol 14 p 619] made a systematic study in non-syphilitic patients inoculated with malaria for psychoses

using as controls similar patients not so inoculated. In every case the malaria produced syphilitic serum reactions. The present authors have studied 11 similar patients inoculated with malaria (3 by blood and 8 by mosquito bite) and had serial tests of their blood carried out by HINTON, KAHN, KLING and KOLMER, each of these using the method or methods associated with his name in addition the same specimens were tested by MAHONEY using the Kahn, Kling and Kolmer methods. The tests were carried out weekly during the incubation period every 4 days during the febrile period (10 paroxysms) and then weekly until the reactions had again become negative. Prior to the inoculation none of the 11 gave a positive reaction and only two workers Hinton and Mahoney reported other than negative reactions with them the first getting a doubtful reaction with his test and the second a doubtful with the Kolmer Wassermann test. In the subsequent assessment the Hinton and the Kolmer (Mahoney operated) tests of the sera from these two cases were not counted.

During or after the febrile period all the sera gave at least one positive reaction to the Kahn Standard and Kling Diagnostic tests. The Eagle Wassermann gave positive reactions with 5 doubtful with 1 and negative with 5 the Eagle micro-flocculation test gave positive with 4 doubtful with and negative with 6 the Hinton gave doubtful with 3 and negative with 7 the Kolmer in Kolmer's hands gave positive with 7 and negative with 4 and the Kolmer in Mahoney's hands gave positive with 9 and doubtful with 1. With one exception no case was positive before the outbreak of the fever in the exceptional case the first positive reaction occurred in blood taken on the day before the first paroxysm. The occurrence of the positive reactions was in no case fortuitous after a patient had given a positive reaction he gave one or more afterwards and a negative reaction was never sandwiched between two positive ones. The highest percentage of positive reactions occurred 15 to 21 days after the start of the febrile period, i.e. in the last week before the malaria was ended by administration of quinine. With the exception of one case all were negative again 4 weeks after termination of the fever. Thus the investigation supports the findings of KITCHER *et al* and indicates that in serological surveys to determine the prevalence of syphilis in a population regard must be paid to the possibility that positive reactions may be due to recent attacks of malaria.

L. B. Harrison

BRYANT (J) Heavy Atebrin Dosage in the Treatment of Malaria.—
East African Med J 1942 Jan Vol. 18, No 10 pp 285-301

The author writes with long experience of malaria in the Bahr el Ghazal Province of the Sudan, where *P. falciparum* infections are often characterized by very high temperature, frequent vomiting and prostration, and great difficulty in finding parasites in the peripheral blood in very severe attacks of fever. Moreover blackwater fever was frequently observed after an injection of quinine or after large doses of quinine had been given by mouth. He found that atebrin in doses of 0.3 gm. a day did not control severe malaria, that atebrin combined with plasmoquine produced nausea and colic or vomiting, and that atebrin combined with quinine made the recipient feel exceedingly ill. Such experience led him to administer atebrin in much larger doses than those usually recommended. He found that 0.6 or even 0.9 gm.

a day produce no ill effects if plenty of hot very sweet tea, or sugar in some other form is taken. It is believed that the parasitocidal action of atabrin is not marked till the renal threshold of the drug has been reached when the urine becomes bright yellow the temperature falls and improvement in the patient's condition is immediate.

In the treatment of a severe case 0.3 gm. of atabrin musonate is given intramuscularly and 0.3 gm. atabrin by mouth on the first day if the tablets are vomited the injection is repeated after 3 hours. In serious cases a third dose of 0.3 gm. may be given 0.9 gm. in all on the first day. On the second day 0.6 gm. is given in two doses if nausea persists an injection of atabrin musonate replaces the first dose. Thus during the first two days from 1.2 to 1.5 gm. of atabrin are given. Thereafter three tablets (each of 0.1 gm.) a day in one dose after breakfast are taken until 24 tablets in all have been administered. Many people cannot tolerate more than twenty tablets. This course of atabrin is followed after an interval of four days by quinine 15 grains a day for four days. After another four-day interval two tablets of plasmoquine simplex (each of 0.01 gm.) three times a day for three to four days if tolerated complete the specific treatment.

A constant bitter taste in the mouth and some depression were the only toxic symptoms produced by these large doses of atabrin. Nausea indicates the necessity for terminating treatment or reducing the dose of atabrin towards the end of the course. Plenty of sugar prevents toxic symptoms.

Splenomegaly and relapse are uncommon after this treatment.

Self treatment by laymen in remote stations is encouraged for this purpose a sheet of instructions is issued.

Norman White

RUSSELL (Paul F.) & KNIFE (Fred W.) Malaria Control by Spray-Killing Adult Mosquitoes. Third Season's Results.—*Jl Malaria Inst of India* 1941 Dec Vol. 4 No 2. pp 181-197 With 4 figs.

Two previous papers on malaria control by spray killing adult mosquitoes in South Indian villages have been published by the authors [see this *Bulletin* 1940 Vol. 37 p 504 1941 Vol. 38 p 645]. This paper records the results obtained by a continuation and extension of the work previously reported. Efforts were made to find the most satisfactory type of spray apparatus. Hand pumped air tanks and power filled air tanks were used. In both cases the tanks were fitted with pressure reducing regulators to insure a constant pressure on the spray-gun nozzle. The best method of generating gas pressure is by the use of solidified carbon dioxide [this *Bulletin* 1942 Vol. 39 p 181] but its high cost in India makes it impracticable. For power filled air tanks a small portable compressor driven by a petrol engine was used. The tank carried on the labourer's back was fitted with an automobile tyre valve and the operation of charging was similar to the inflation of a motor tyre at a service station. The ordinary flit gun type of sprayer is not substantial enough for extensive use and is wasteful of insecticide. Efforts are being made to design a cheap and simple apparatus that will withstand hard usage and give a well vaporized spray.

In addition to Kasangdu the village in which spraying operations have been carried out for three years three other villages were sprayed

In 1940 In one a locally made extract of Indian pyrethrum flowers was used instead of Pyroside 20. It was found to be as effective and was little more than half the cost of Pyroside 20.

The effect of spraying on malaria incidence was satisfactory. Spleen rates in Hasangdur have fallen from 68 in the malaria season of 1937 to 6 in 1940. parasite rates from 57 to zero. No infant was found infected in 1940. Downward trends in spleen and parasite indices were noted in the other villages. In a control village spleen and parasite rates have become a little higher.

The cost of spraying has been reduced to 5 annas per head of population per annum. The villagers like the method. Local free labour would still further reduce the cost. The measure is ever recurring but it is effective.

Norman White

Jon (T. J.) On the Comparative Efficacy and Relative Costs of Biological and Chemical Methods of Mosquito Control in Clean-Weeded Railway Borrowpits at Fuleswar Bengal.—*Jl Malaria Inst of India* 1941 Dec Vol 4 No 2 pp 211-215

Bunds were erected dividing a borrowpit into three equal sections each 20 feet by 12 feet. The margin was clean and the bottom muddy. One section was treated with Paris green on every fifth day. Into the second section 96 adult and 48 young *Afrocheilus panchar* were introduced. The third section was an untreated control. The fish destroyed all aquatic stages of both anopheline and culicine mosquitoes. Paris green destroyed the late instar larvae of anophelines only. The cost of introducing and replenishing supplies of fish was only a tenth of the cost of applying Paris green. Norman White

CORRADETTI (Augusto) Die biologische Bedeutung des endohistiozytären Zyklus des *Plasmodium gallinaceum* [Biological Significance of Exoerythrocytic Cycle of *P. gallinaceum*].—*Zent f Bakt I Abt Orig* 1942 Feb 16 Vol. 148. No 6. pp 274-279 [33 refs]

The presence or absence of exo-erythrocytic schizonts in fowls inoculated with *Plasmodium gallinaceum* depends on the degree of balance between the host and the parasite. When sporozoites are injected into fowls exo-erythrocytic schizonts are demonstrable in the organs before the erythrocytic forms appear. Thirty days after the inoculation they are no longer present. When an emulsion of an organ containing exo-erythrocytic forms is injected the course of events is similar to that following injection of sporozoites. A different result follows injection of blood from a fowl the inner organs of which contain no exo-erythrocytic forms. After an incubation period of eight to ten days erythrocytic forms appear in the blood. These increase for about 11 days after which one of two courses may be followed. Either the infection decreases in intensity from day to day, indicative of a developing balance between host and parasite or no such decrease occurs. In the former case the blood infection persists for some months and there is no development of exo-erythrocytic schizonts, while in the latter there follows a flooding of the reticulo-endothelial system with parasites which later give rise to exo-erythrocytic schizonts. When blood from a fowl whose inner organs contain exo-erythrocytic schizonts is injected into a healthy fowl either exo-erythrocytic

schizonts are found to be present when the erythrocytic forms first appear or else they appear later. It seems therefore that when sporozoites or exo-erythrocytic forms are injected into fowls invasion of the reticulo-endothelial cells occurs with the development of exo-erythrocytic schizonts because there is as yet no immunity. In support of this conclusion the author states that he has shown that the injection of sporozoites or exo-erythrocytic schizonts into fowls which have passed into the latent phase of an infection and have developed some degree of immunity is not followed by the development of exo-erythrocytic schizonts. In all cases as the immunity develops the exo-erythrocytic cycle ceases. The exo-erythrocytic forms are not developed solely from sporozoites. They arise from merozoites which have been produced by exo-erythrocytic as well as erythrocytic schizonts. The absence of these forms from fowls with a developed immunity shows that the resistance of infections to drugs and the tendency to relapses cannot be explained by assuming that the exo-erythrocytic forms are responsible for they are no longer present. Relapses are due to the persistent erythrocytic forms which have taken on a renewed activity. Parasites such as *P. gallinaceum* are thus able to infect cells of the reticulo-endothelial system as well as red blood corpuscles but the former only so long as no immunity or balance between host and parasite exists.

C M Wenyon

ZAIN (H) Verhalten der aus erythrocytären Parasitenformen hervorgegangenen E Stadien des *Plasmodium gallinaceum* [Behaviour of Exoerythrocytic Stages of *P. gallinaceum* Developed from Erythrocytic Forms.]—*Arch f Experim Path u. Pharm* 1941 Dec 8 Vol. 198 No 4/5 pp 551-556 With 2 figs.

If fowls are infected with *Plasmodium gallinaceum* by injection of sporozoites the first forms to develop are the exo-erythrocytic schizonts. The merozoites from these can give rise to further exo-erythrocytic schizonts or to the erythrocytic pigmented parasites. The exo-erythrocytic schizonts are readily demonstrable in the brain at the time of the commencement of the acute malarial infection. If blood containing erythrocytic forms only is inoculated intramuscularly the first forms to develop are erythrocytic forms and it is only about two weeks after the first appearance in the blood of these pigmented parasites that exo-erythrocytic schizonts are to be found in the brain. The injection of sporozoites thus leads to the early appearance in the brain of exo-erythrocytic schizonts while injection of pigmented parasites leads to their late appearance. In the latter case it is evident that the exo-erythrocytic schizonts have developed from the erythrocytic forms. In an earlier paper [this *Bulletin* 1942 Vol 39 p 26] it was shown that injection of those exo-erythrocytic schizonts which had developed from sporozoites and had appeared early again led to the early appearance of such forms in the inoculated fowls. The question arose as to whether the injection of exo-erythrocytic schizonts which had developed from erythrocytic forms and had appeared late would also be followed by the early development of exo-erythrocytic forms. The present paper describes experiments designed to test this point. The result was that the injection of such forms is followed by the early appearance of the schizonts in the brain just as it is after the injection of sporozoites or the early appearing exo-erythrocytic forms developed from them.

C M Wenyon

BELTRAN (Enrique) & VARGAS (Luis) Intentos de infección de pollos con esporozoitos de *Plasmodium gallinaceum* por vía oral. [(Failure of) Attempts to Infect Fowls with *P. gallinaceum* by the Mouth.]—*Rev. Inst. Salubridad y Enfermedades Trop. Mexico*. 1941 Dec. Vol. 2, No 3-4 pp. 347-351 English summary (8 lines)

Negative results are reported in attempts to infect chickens with sporozoites of *P. gallinaceum* by oral route. Salivary glands of 4 *anopheles*'s heavily parasitised, were used suspended in Locke solution doses given were from one to eight pairs of glands. Six three months old chickens four four months old chickens and six seven days old chickens were employed. Two of those animals were inoculated, respectively with sporozoites intramuscularly and intravenously, both developed typical infections with high parasite counts.

SHOYTI (H. E.) MENON (K. P.) & SEETHARAMA IYER (P. V.) The Natural Host of *Plasmodium gallinaceum* (Brumpt, 1935).—*Jl. Malariis Inst. of India*. 1941 Dec. Vol. 4 No. 2 pp. 175-178

Owing to the fact that wherever *Plasmodium gallinaceum* has been discovered in domestic fowls the wild jungle fowl is found in the adjacent forest the authors were led to examine the jungle fowl for a *P. gallinaceum* infection. In only one of 40 birds examined was a malarial parasite found, and this was successfully passed to the domestic fowl. Morphologically the parasite from the jungle fowl does not differ in any way from *P. gallinaceum* while cross immunity tests support the identity of the two parasites. The conclusion is reached that the original host of *P. gallinaceum* is probably the jungle fowl, the exact species of which varies with the locality. C. M. Werners

BLACKWATER FEVER.

HOLM (B.) Successful Use of Sulfanilamide in Treatment of Blackwater Fever.—*Michigan State Med. Soc. Jl.* 1941 Dec. Vol. 40 p. 988 Summary taken from *Jl. Amer. Med. Assoc.* 1942 Mar. 14 Vol. 118 No. 11 p. 924

Holm encountered a case of blackwater fever in northern Michigan and successfully treated the patient with sulfanilamide. No reports of the previous use of sulfanilamide for blackwater fever are to be found. The interesting features of the case were an unusually high fever (the axillary temperature being 109.4°F) extreme anaemia, the dramatic response to sulfanilamide of a patient who was moribund and who had previously failed to respond to any form of treatment and the removal of blood pigment stones from the gallbladder. The stones probably resulted from a concentration of blood pigments because of the hemolytic anaemia rather than from an infection of the gallbladder.

TRYPANOSOMIASIS

Wood (Sherwin F) Reactions of Man to the Feeding of Reduviid Bugs.—*Jl Parasitology* 1942. Feb Vol. 28 No 1 pp 43-49

Reactions have been recorded to the bites of these bugs which vary from slight local redness to severe illness lasting several weeks. The author placed specimens within reach of his own hand or arm on many occasions but during feeding there was no marked physical discomfort nor were there any after-effects when *Triatoma protracta* *T. p. woods* *T. longipes* *T. heidemannii* *T. gerstaeckeri* *T. sanguisuga* and *T. rubida* were used. With *Paratriatoma hirsuta* local irritation at the site of the bite with itching and swelling appeared 40 hours after the feed. None of the bugs was infected with *Trypanosoma cruzi* though all are potential vectors. The experiments were undertaken to draw a distinction between the effects due to non infected and infected bugs since a prevalent symptom of infection is palpebral oedema. C IV

MAZZOTTI (Luis) & LEON (Luis A.) Infección experimental por *Trypanosoma cruzi* de *Triatoma carrioni* del Ecuador [Experimental Infection of *Triatoma carrioni* with *Trypanosoma cruzi*].—*Reprinted from Medicina Mexico* 1942 May 10 Vol. 22. No 411 pp 191-193 With 1 fig

Triatoma carrioni was described by Larrousse in 1926 from specimens caught in Loja, Ecuador. The authors have examined 19 specimens but did not find any harbouring *T. cruzi*. They tried to keep them alive for experimental work but most of them refused to feed and died. Two larvae however were fed for 2 months and remained healthy. Then on 5th January 1942 one was fed on a rat which had been previously infected with *T. cruzi* and had the trypanosome in its blood. On February 9th that is five weeks later evolution forms of *T. cruzi* were seen in the dejecta of the larva.

The inhabitants state that this *Triatoma* flies in from the fields at night attracted by the lights in dwellings. Though the adult insect lives outside it seems to prefer to enter the houses to lay its ova for larvae are found in the houses. In the province of Azuay patients are seen with palpebral oedema chronic and acute and medical men believe that American trypanosomiasis exists there [the difficulty of proving this should not be great] and in view of the above experiment it is quite likely that this *Triatoma* is the transmitter. More investigation is to be undertaken to clear up the doubt.

H Harold Scott

MAZZA (Salvador) FREIRE (Ramon S) & SALICA (Pedro N) Investigaciones sobre enfermedad de Chagas. Formas meningoencefálicas primitivas y secundarias de enfermedad de Chagas. Considerable gravedad del proceso y tratamiento adecuado con 7602 (Ac) Bayer [Meningo-encephalitis in Chagas's Disease].—*Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina (Jujuy) Publicación No 60* 1942 35 pp With 18 figs [13 refs]

Meningo-encephalitis may appear as an early (primary) or later (secondary) manifestation of Chagas's disease. Treatment by Bayer 7602 in the doses recommended by Mazza brings about a cure in a

[October 1942]

considerable proportion of cases but the complication is a serious one. Of 29 cases known and described death occurred in 11. This form of the disease is characterized by crises of convulsions, which may be limited to certain parts, arms or legs or may be general, attacks coming on every 5-20 minutes in severe cases. In the intervals the patient (those recorded were children in the first year of life) usually sleeps. Details of five patients are recorded—two of 3 months and two of 4 months—these three recovered—and two others of 3 months who died. Photographs show the infants in convulsions and in the calm state between the attacks, and photomicrographs show clear glia cells and leishmanias forms of the parasite.

The site of inoculation is often not found in these cases—*România* sign may be absent—and it is thought that infection may take place either by the mother's milk or that in some cases it may be transmitted congenitally.

The treatment the only treatment proving effectual is that by Bayer 7802 injected intramuscularly in doses of 100 mgm per kilo and persevered with. The two infants who died had received less than one third of this dose and they died on the 13th day of illness.

H. Harold Scott

RIVERALL (Alberto P.) Inexistencia do Signo de România " en chagras sem o descriptor do Tinogasta (Catamarca) (Chagas's Disease without România's Sign).—*Revista Médica Argentina* 1942 Feb 4 Vol 29 No 6 15 pp With 1 fig. [11 refs]

TORRES (C. Magalhães) Alterações dos capilares do coração na infecção experimental pelo *Schizotrypanum cruzi* (Changes in the Cardiac Capillaries in an Animal Infected Experimentally with *T. cruzi*).—*Anais Acad. Brasileira de Ciências* Rio de Janeiro 1942 Mar 31 Vol 14 No 1 PP 1-5 With 8 figs. on 4 plates. English summary

A puppy one month old was inoculated with *T. cruzi* and killed after 13 days and its heart examined histologically. Only a few of the muscle fibres showed aggregation of the parasite and in most of the sections examined the interstitial tissue appeared normal. Other however showed signs of acute diffuse interstitial myocarditis characteristic of Chagas's disease. Cellular infiltration round the capillaries of the myocardium was present but not in the tissue between the muscular fibres containing the agglomerations of the trypanosome. The inflammatory exudate consisted mainly of macrocytes (like the large mononuclears of the blood) with occasional lymphocytes and plasma cells. The endothelium was swollen and the lumen dilated in the early stages. Later the perivascular infiltration was more intense the blood content lessened and the lumen small in fact the walls might be collapsed. The cellular infiltration is held to be due directly to the damage of the myocardium and not associated with the presence of the trypanosome in the focus itself. The article is illustrated with good photomicrographs.

H. Harold Scott

LEISHMANIASIS

GELDRICH (J) **First Case of Kala-Azar in Hungary**—*Monatsschr f Kinderheilk* 1941 Feb 5 Vol. 85 p 332 [Summary taken from *Jl Amer Med Assoc* 1942 May 23 Vbl 119 No 4 p 379]

According to Geldrich the infantile form of kala azar or *Leishmania infantum* occurs in the Mediterranean countries but is practically confined to the coastal regions. In Hungary it has as yet not been observed although the disease was watched for by pediatricians and internists, particularly during the years after 1920 when numerous cases were reported in Italy. The case reported is the first encountered in Hungary. The splenomegaly hepatomegaly intermittent fever and the characteristic blood changes led to the diagnosis of kala azar and the demonstration of *Leishmania donovani* in the splenic punctate corroborated it. Intravenous injections of neostibosan (a pentavalent antimony compound) were given beginning with 0.03 Gm and increasing to 0.07 Gm 0.1 Gm and finally to 0.2 Gm. The injections were given every second or third day. In all the child received 1.2 Gm of neostibosan. The effects of the treatment became apparent after the fifth injection when the fever subsided. A follow-up examination after seven months disclosed that the splenomegaly and hepatomegaly had completely disappeared and that the child can be considered cured.

PESSOA (S B) **Dados sobre a epidemiologia da leishmaniose tegumentar em S Paulo** [Epidemiology of Cutaneous Leishmaniasis in S Paulo]—*Arquivos de Hig e Saude Pública* 1941 Jan Vol 6 No 11 pp 103-121 With 4 graphs & 1 fig [20 refs] English summary

A study of 256 cases of tegumentary leishmaniasis in S Paulo has revealed a number of points of epidemiological interest.

In areas of high endemicity the majority of cases occur in individuals who give a history of six to twelve months residence. The incidence falls off with longer residence and some people remain uninfected for several years. Cases occur most commonly in the autumn but new cases may occur all the year round. The prevalence of the disease bears a definite relationship to the density of the sandfly population to the predilection of these to attack human beings and to the atmospheric temperature and humidity.

As regards cure this may occur spontaneously in 7 per cent of the cases. Of cases which have had cutaneous lesions for a year or more as many as eighty per cent reveal some involvement of the nasal mucosa. Both infants and adults are liable to infection the disease tending to be more severe in the former. The Montenegro skin test is generally more strongly positive in negroes than in whites.

C M Wenvon

PESSOA (Samuel B) & PESTANA (Bruno R) **A intradermo-reação de Montenegro nas campanhas sanitárias contra a leishmaniose** [Montenegro Skin Test in Leishmaniasis]—*Arquivos de Hig e Saude Pública* 1941 Jan Vol 6 No 11 pp 125-137 With 4 figs. English summary

The authors describe their experience of the Montenegro skin test carried out on 3 000 occasions during the course of a campaign against

mucocutaneous leishmaniasis in Brazil. The test is performed by injecting intradermally an antigen prepared from the cultural forms of *Leishmania brasiliensis*. In a positive case there develops during the course of 48 hours a specific papule which persists for 4 or 5 days. The reaction is a group one for like results are obtained with antigens prepared from cultures of other species of *Leishmania* as well as from cultures of *Trypanosoma cruzi*. As with other similar biological tests certain cases of known infection may fail to give a positive reaction while a positive reaction may sometimes be obtained in other infections. On this account the test should always be controlled by careful clinical observation. In spite of its limitations, in the carrying out of a sanitary survey the test is the best method available for the detection of leishmania infections. C M Wenyon.

PESSOA (S B) & PESTANA (B R.) Ensaio sobre a vacinação preventiva na leishmaniose tegumentar americana com germes mortos [Attempt at Preventive Vaccination with Killed Organisms in American Cutaneous Leishmaniasis].—*Arquivos de Hig e Saude Pública* 1941 Jan. Vol 6 No 11 pp. 141-147 [12 refs.] English summary

In Alta Paulista in Brazil, where mucocutaneous leishmaniasis is endemic the authors have attempted the immunization of susceptible individuals with a vaccine prepared from cultures of leishmania. In one district 263 persons received subcutaneous injections of the vaccine while 600 were observed as controls. During the course of the following four months 50 of the controls acquired the disease while only three of the vaccinated individuals did so. These figures give an infection rate of 1 per cent in the vaccinated as against 8 per cent in the unvaccinated. The authors consider that these figures are sufficiently encouraging to justify a continuance of the method perhaps with a modified and improved vaccine. C M Wenyon

FEVERS OF THE TYPHUS GROUP

FITZPATRICK (Florence) & HAMPIL (Bettylee) Immunological Reactions in Rickettsial Diseases with Special Reference to the Time of Appearance of Antibodies.—*Amer Jl Public Health* 1941 Dec Vol 31 No 12 pp 1301-1305 With 2 charts

In 1921 EPSTEIN reported that the convalescent sera of typhus patients agglutinated antigen prepared from infected lice. In 1932 ZIMMER and CASTAÑEDA found that sera of patients convalescent from murine typhus agglutinated European and murine Rickettsiae. No correlation has been shown to exist between the Weil-Felix reaction and the presence either of Rickettsial agglutinins or protective antibodies.

The experiments recorded in the present paper suggest that Rickettsial agglutinins appear earlier than the Weil-Felix response, that they are more persistent and more specific and that they are correlated with the presence of protective antibodies.

Rabbits were used 25 for the experiments dealing with Rocky Mountain spotted fever and 12 for those on louse-borne typhus. The animals were inoculated by the intraperitoneal route with suitably prepared cultures of *Rickettsiae* grown on agar with chick-embryo tissue. The same cultures were used in the preparation of suspensions for the agglutination tests. Some of the animals received weekly injections for 4 to 20 weeks others were given only two to three injections at three-day intervals. The protective tests were made by mixing 1 ml. of virulent passage blood with varying amounts of rabbit serum which had been stored for several weeks in the ice chest. The mixtures were injected intraperitoneally into guinea-pigs.

A typical immunological response following three injections of spotted fever *Rickettsiae* at three-day intervals is shown in the following table —

Time of bleeding	Agglutination titre		Blood infections	Protective antibodies	
	Weil Felix	<i>Rickettsial</i> agglutination		Amount of serum	Response
1 week	0	1-80	Yes	1.0 ml.	Absent
2 weeks	1-160	1-1 280	No	1.0 ml.	Present
3 weeks	1-80	1-1 280	No	1.0 ml.	Present
6 weeks	0	1-1 280	—	—	—

A very similar type of response was shown by rabbits which had received weekly injections of typhus *Rickettsiae*. In all the experiments the antibodies appeared in the same sequence. *Rickettsial* agglutinins always appeared first from the fifth to the eighth day they always reached a titre of 1-1 000 or more. Next the *Proteus* agglutinins appeared from the seventh to the fourteenth day. In a few cases the Weil-Felix reaction was negative throughout. Between the twelfth and the eighteenth day the protective antibodies appeared in a high degree of potency and the rabbit's blood no longer contained living virus. Despite weekly injections the *Proteus* agglutinins dropped to zero in one to five weeks whereas the *Rickettsial* agglutinins and the protective antibodies remained at a high level for at least seven months, even after the inoculations had been discontinued.

Studies in progress on human sera from cases of spotted fever showed a similar reduction or disappearance of the Weil-Felix response during convalescence and the persistence of *Rickettsial* agglutination in cases in which the Weil-Felix response had become negative.

If further tests in human cases should show that the *Rickettsial* agglutination response appears earlier than the Weil-Felix reaction the former test will be valuable in this respect and in being more specific than the latter especially in areas in which both louse-borne typhus and Rocky Mountain spotted fever occur.

John W D Megaw

KLOSE (H.) Zur Epidemiologie des Fleckfiebers. [On the Epidemiology of Typhus Fever]—*Klin Woch* 1942 May 30 Vol. 21 No 22. pp 498-500

Several examples are given of outbreaks of typhus fever among the personnel employed in prison camps in spite of conditions which

exclude the possibility of infection being conveyed by the bites of infected lice. The only conceivable way in which infection could have been conveyed was by the faeces of infected lice in which Rickettsiae are known to survive for long periods of time even after disinfection with cyanide gas has been carried out. The dried faeces of lice may adhere to the skin or clothing of patients, but further research is needed to show whether the infection is conveyed directly through the skin, by the inhalation of infected dust or by smear infection.

In any case delousing, even when repeated thrice at intervals, is not a sufficient safeguard. Effective disinfection of the skin by chemical antiseptics and of the clothing, bedding, mattresses, etc. by steam sterilization or dry heat is essential.

John W D Magee

STEUER (W) Ueber serologische Umgebungsuntersuchungen bei epidemischem und endemischem Fleckfiebertvorkommen [Local Serological Investigations into the Occurrence of Epidemic and Endemic (Louse-borne) Typhus Fever]—*Ztschr f Immunitätsf u Experim Therap* 1942, Feb 25 Vol. 101 No 2 pp 102-121

This important paper deserves close study by all who are interested in the epidemiology of typhus fever.

The recently devised dry-blood agglutination test ('Tr BA test') of Kudicke and Steuer [see this *Bulletin* 1942, Vol 39 p 372] enables workers to carry out a rapid survey on the spot for the purpose of discovering the existence of atypical, mild and unrecognized forms of the disease. A *Proteus OX19* suspension, killed by heat at 75°C. and preserved by the addition of alcohol to the extent of 20 per cent keeps for at least five months.

The first survey was made in the district of Krakow in Poland in 13 out of 26 localities in which epidemics occurred, mostly in the months of April, May and June, 1941. In these localities 544 cases were reported with 64 deaths. Altogether 879 persons were tested of these 642 were recent immigrants. Of 28 persons who gave a history of having had typhus fever between 1912 and 1939 only three gave a weak reaction the rest were negative. Of 29 persons convalescent from typhus 25 were positive. In 10 active cases tested between the second and the ninth days the response was negative.

The general results show 200 positive and 679 negative reactors. Included among the negatives were 20 patients either in the febrile stage or recently convalescent of whom six were ambulatory cases. The 200 positive cases were made up of 125 active cases and convalescents, 35 ambulatory cases, including some persons who had recently had some symptoms of disease, and 40 symptom-free persons of whom three gave a history of previous attacks.

Detailed enquiries were made in the 41 ambulatory cases most of these were in permanent residents of the localities. The usual story was that they had been having headache or fever or both some admitted only to having been out of sorts or unwell for a short time they thought they had influenza or lumbago with catarrh still others had no symptoms of any kind but they were found to have a spotted rash of a more or less pronounced type nearly all gave positive reactions. The ambulatory cases accounted for about 8 per cent of all the cases of typhus and were mostly in children 18 belonged to the 3 to 10 age-group and 14 to the 11 to 15 age-group.

The epidemiological importance of these cases is shown by the frequent occurrence of typical attacks of typhus in the family or neighbourhood of the patients.

The 37 symptom free reactors were also kept under observation frequently the reaction was in moderate titres and so could be explained as being a non-specific or anamnestic reaction or as being due to a reinfection in an unimmune person. In six instances there were two reactors of this kind in the same family and two brothers who gave weak reactions suffered a fortnight later from mild attacks of typhus. In some cases there was a rising Weil Felix titre for example one person who reacted up a titre of 1 in 200 was found four weeks later to have a titre of 1 in 3,200 although he had no symptoms two members of his family had attacks of typhus at the time.

Other surveys were made in Krakow city where only occasional sporadic cases of typhus were occurring. A group of 200 healthy Polish children was tested for Tr BA and Weil Felix reactions all gave negative responses. On the other hand a group of 300 healthy Jewish children yielded 13 positives the Weil Felix titre being 1-200 or less. Altogether 1 080 healthy controls including the above 500 were tested in Krakow and other places in the district in which no epidemics were known to have occurred in recent times. 42 reacted to the test but none in titres higher than 1-200 whereas higher titres were often observed in symptom free persons living in epidemic areas.

Another control survey was made in a large hospital [presumably in Krakow] 1 000 patients suffering from other fevers were tested only three reacted of whom two gave Weil Felix responses \pm 1-100 and one +1-100. No tests were made with lower titres in these cases.

A further control survey was made in 1 487 German soldiers suffering from various diseases of these 1 339 were negative 99 reacted at 1-50 7 at 1-100 \pm 36 at 1-100 1 at 1-200 \pm 2 at 1-200 and 3 at titres higher than 1-200. The last-mentioned three cases were closely investigated in one of them the serum was haemolytic and positive agglutination occurred against the organisms of abortus fever Flexner dysentery and Shiga Kruse dysentery in titres of 1-200 to 1-400 the second case proved later to be one of paratyphoid B in the third week the Weil-Felix titre in this case was 1-100 and five days later it rose to 1-400 the third case was of a doubtful nature but although typhus fever was excluded the titre rose from 1-200 to 1-6 400 within two days. In the two latter cases the rising titre was regarded as being anamnestic in all probability and as resulting from a previous infection with *Proteus X19*. No *Proteus* organisms could be found in the stool or duodenal fluid in either of the cases. The rising titre in these two cases could not be satisfactorily explained on the grounds of contact with typhus patients.

In the conclusions the following observations are made.—Children and young persons often suffer from mild and unrecognized attacks of typhus fever sometimes even when they live in typhus-free localities and have had no previous contact with typhus patients. Adults in such localities sometimes have ambulatory attacks. A high titre Weil Felix reaction may occur without symptoms in children and young persons living in infected areas even in the absence of previous attacks or protective inoculation. The Rickettsial agglutination response which has been found to occur in similar conditions needs further investigation. General surveys not only of the families of reactors

but also of the rest of the population must be made when symptom-free reactors are discovered to exist. Ambulatory and latent cases must be segregated, deloused and kept under observation. They usually harbour infected lice. Whether lice become less intensively infected when they feed on persons with mild attacks than when they feed on severely affected patients is a point that needs further investigation.

John W D Megaw

HALLMAN (L.) Serologische Schnellreaktion zur Fleckfieberdiagnose am Krankenbett. [A Rapid Bedside Serological Test for Typhus.]—*Deut. Militärarz.* 1942. Mar Vol 7 No 3 pp 198-199. With 1 fig.

The test has been named the "Proteus Typhus-Fever Test". It has been claimed to be new in two respects: the employment of small drops of whole blood on a slide and the use of stained bacterial suspensions to facilitate the observation of agglutination. In both of these points the author has been anticipated, as can be seen by a reference to the paper by VEJNTEMILLAS in June 1941 (see this *Bulletin* 1942, Vol 39 p 141).

The reagents are: (1) A filtered alkaline solution of methylene blue (saturated alcoholic solution of methylene blue 10 cc. 1-6 per cent. solution of caustic potash 1 cc. and distilled water 100 cc.) (2) A 24 hour agar culture of *Proteus OX19* suspended in normal saline. The reagents keep for some time in the ice chest but are brought to room-temperature before being used. Slides of opal glass are best, but plain slides placed on a white background will do.

A measured drop (0.05 cc.) of the stain is placed on the slide and 0.1 cc. of the bacillary suspension is mixed with it. Then 0.05 cc. of freshly drawn whole blood is added and stirred in, making a pool of 2 to 3 cm. in diameter. The slide is tilted to and fro for four minutes. When the reaction is negative no change occurs in the original appearance of the suspension which is red-brown in colour. A positive reaction is shown by the formation of blue-green clumps of varying size. The reaction can be made quantitative by carrying out simultaneous comparative tests with the standard Weil-Felix method.

Comparative tests were made with the Weil-Felix reaction in 500 cases of proved typhus fever and a high degree of conformity was observed. In 100 samples of blood which had reacted to the Widal test 14 unexplained positives occurred in titres of 1-200 or less. The same number occurred with the Weil-Felix test.

Serum can be used instead of whole blood. In this case 0.03 cc. of serum is used instead of 0.05 cc. of blood. John W D Megaw

GROOT (Hernando) MAYORAL (Pedro) & MARTINEZ (Luis Eduardo) Diagnostica y profilaxis del tifo exantematico en Nariño. [The Diagnosis and Prevention of Typhus Fever in Nariño.]—*PwB Lab Hig. Nariño* Pasto 1940-41 pp 63-116. With 10 figs. (1 folding map). [Bibliography.]

More than half of this long paper consists of a survey of laboratory methods of diagnosis of diseases in general; the rest deals specially with the diagnosis and prevention of typhus fever, which has recently been found to be an important disease in the Nariño department of Colombia. The relative frequency of typhus in Nariño can be estimated from

the fact that of 299 specimens of blood sent to the local Laboratory of Hygiene between January 1940 and August 1941 nearly 10 per cent were found to be from cases of this disease. Most of the blood specimens were inadequate so that many cases are likely to have escaped detection. The other diseases diagnosed from the specimens were — bartonellosis (18.3 per cent) malaria (18.5 per cent) typhoid fever and relapsing fever (1.0 per cent each).

For the rapid diagnosis of typhus fever 0.05 cc. of serum diluted 10 times with saline is mixed on a glass slide with 0.1 cc. of a heat killed suspension of *Proteus X19* preserved by the addition of 1.0 per cent formol. Agglutination is shown by the formation of small clumps of bacilli which are easily seen with oblique illumination. Positive reactions with serum diluted 30 times are regarded as specific. Castañeda's method in which Rickettsial suspensions are used in the same way gives earlier and usually stronger positive results. Even the Castañeda protective vaccine can be used for this rapid test. 0.01 cc. of the vaccine is mixed with 0.05 cc. of a 1 in 10 dilution of serum. The response is not so pronounced as with the special Rickettsial suspension.

In connexion with prevention it is stated that the incubation period may be as long as 23 days so that all persons who have been in contact with a patient within that period must be deloused and kept under observation. Clothing for disinfection is at once placed in a metal receptacle which is hermetically sealed after the addition of 50 cc. of petrol or benzene. After an hour's treatment the articles can safely be sent for complete disinfection. Attendants on patients or suspects wear rubber gloves and blouses. Their arms and legs are rubbed with a mixture of 20 grammes camphor in 200 cc. oil.

The Castañeda killed vaccine prepared from the lungs of mice inoculated with murine virus by the intratracheal route has been selected for trial and has been used on 34 persons exposed to risk of infection in the laboratory. None of the inoculated persons has yet been attacked.

John W. D. Megaw

VAN MEEBENDONK. Erfahrungen ueber Fleckfieberbehandlung mit Atebrin und Plasmochin. (Vorläufige Mitteilung) [*The Treatment of Typhus Fever with Atebrin and Plasmoquine.*]—*Deut. Militärärztl.* 1942, Apr. Vol 7 No 4 pp 283-284.

In this preliminary report striking benefit is claimed to have resulted from the use of atebrin combined with plasmoquine in the treatment of a considerable number of cases of typhus fever.

The duration of the fever is said to have been reduced by several days. The temperature usually fell by lysis instead of by crisis. The general course of the attacks was less severe than would otherwise have been expected. Specially satisfactory results were obtained in seven patients aged 42 to 49 years. Most of these would have been expected to die but for the treatment. Owing to shortage of plasmoquine only patients over 40 years of age could be given the combined treatment which was regarded as being more effective than that by atebrin alone.

When no striking response to the drugs occurred within a few days there was nearly always a complicating bronchopneumonia which yielded promptly to eubasinum [sulphapyridine] given intravenously.

Other drugs had previously been tried without effect. These included prontosil, pyramidon, neosalvarsan, convalescent serum and eubasinum. The dosage of atebrin was three tablets (0.06 gramme each).

thrice daily. plasmoquine was given once daily in doses of 0.02 gramme [The Germans have increased their standard tablets of atebm for prophylaxis of malaria from 0.05 to 0.08 gm. see this *Bulletin* 1942 Vol 39 p 396]

In some cases there was vomiting but this could not be attributed with certainty to atebm because most of the patients were also being treated with eubasum for bronchopneumonia.

A further communication dealing with the clinical aspects of the cases is promised.

John W D Megaw

ZUPNIK (Dragutin) Fleckfieberbehandlung mit Plurazol (Sulphapyridin) Vorläufige Mitteilung [The Treatment of Typhus Fever with Plurazol (Sulphapyridine)]—*Med Klin* 1942. Apr 24 Vol 38 No 17 p 396

The claim for the effectiveness of sulphapyridine is based on the results obtained in 11 patients all of whom recovered although two of the cases were of the fulminating and haemorrhagic type in which recovery would normally have been regarded as impossible.

In all the cases the temperature began to fall by lysis three to five days after starting the treatment and reached normal after a further period of four to five days. There were neither complications nor relapses. The suggestion is made that the drug has a special action on the pneumococcal or streptococcal infections which are assumed to be responsible for some of the symptoms of the disease.

The dosage was two tablets ($\frac{1}{2}$ gramme each) five times daily for 10 to 14 days. This meant that the drug was continued for three or four days after the temperature had fallen to normal. In the summary the author states that all the patients recovered under treatment with plurazol in 10 to 12 days.

[Except for the two cases described as fulminating and haemorrhagic the results do not appear to be very convincing. other workers have reported that drugs of the sulphonamide group are useless or even harmful in typhus fever.]

John W D Megaw

WAR OFFICE ARMY MEDICAL DIRECTORATE BULLETIN No 12, 1942
May 8 pp Typhus Exanthematics.

This is an excellent and succinct account of louse-borne typhus, with emphasis on the clinical aspect and some remarks on prevention.

C W

FRANKEL (E M) Louse-borne Typhus Fever—*Med Press & Circular* 1942 May 27 Vol 207 No 21 pp 343-348 With 2 figs. [12 refs.]

PLOTZ (Harry) & WERTMAN (Kenneth) The Use of the Complement Fixation Test in Rocky Mountain Spotted Fever—*Science* 1942 Apr 24 Vol 95 No. 2469 pp 441-442

In view of the practical difficulties connected with the differentiation between typhus fever and Rocky Mountain spotted fever the authors thought that a complement fixation reaction might be of value. No satisfactory antigen for Rocky Mountain fever complement fixation had previously been prepared.

In the present experiments antigens were made from tissue cultures grown by the semi-solid agar method in Kolle flasks. The original virus was obtained from the spleens of guineapigs and was grown in contact with ten-day chick embryo cells. After several weekly transplants the cultures became exceedingly rich in Rickettsiae the antigen was prepared from the 25th to the 35th transplant. Details of the technique are given.

The final preparation contained a rich suspension of Rickettsiae. The usual haemolytic system was used.

Sera from 9 cases of Rocky Mountain spotted fever were tested all gave positive complement fixation reactions (complete fixation with serum dilutions of 1 in 6 or more). The most recent case was at the 12th day of the illness the others ranged up to 4½ years after the attack. All the controls were negative in dilutions of 1 in 3 they included 2 cases of Brill's disease 11 of various febrile diseases 8 Wassermann positives 2 cases of Q fever and 11 normal persons.

In guineapigs inoculated with Rocky Mountain virus fixation was obtained with 8 sera though the average titres were not so high as in human beings. One guineapig became negative six days after the end of the fever another was still positive after twelve days. No fixation was observed in guineapigs inoculated with endemic typhus (7 sera) epidemic typhus (6 sera) Q fever (3 sera) or in normal animals (15 sera). The reaction in guineapigs and monkeys is now being studied.

The results indicate that the complement fixation test may be employed in the diagnosis of Rocky Mountain spotted fever.

[This report in conjunction with the recently published findings of BRINGTON and her colleagues (see this *Bulletin* 1941 Vol. 38 pp 682-690 1942, Vol. 39 p 146) suggest that the complement fixation test may be of great help in the differentiation of the various fevers of the typhus group.]

John W D Megaw

GILDEMEISTER (E) & HAAGEN (E) Fleckfieberstudien II. Mitteilung. Ueber die Züchtung der *Rickettsia mooseri* und der *Rickettsia prowazeki* im Dottersack des Hühnereies und ueber die Herstellung von Kulturimpfstoffen. [The Cultivation of *Rickettsia mooseri* and *Rickettsia prowazeki* in the Chick Yolk Sac and the Preparation of Vaccines from the Cultures.]—*Zent f Bakt* I Abt Orig 1942 Feb 16 Vol. 148 No 6 pp 257-284

Cox and others have already shown that vaccines prepared from yolk-sac cultures of the Rickettsiae of typhus fever are effective in the immunization of experimental animals.

Details are given in this paper of the preparation of vaccines from yolk-sac cultures of *R. mooseri* and *R. prowazeki*; greater difficulties were encountered in dealing with the latter organism than with the former but the authors show how these were overcome. Although the vaccines have not yet been tested in human beings exposed to the risk of infection with typhus fever the results of animal experiments suggest that the egg yolk vaccines will confer a degree of partial immunity equal to that produced by Weigl's vaccine. The chief advantage of the method is that large quantities of vaccine can be prepared without resorting to the elaborate and expensive technique involved in Weigl's method. Complete protection cannot be expected from any vaccine since even an attack of the disease does not confer

complete immunity. Louse-control must still be the basic method of dealing with typhus fever but vaccines will play an important subsidiary part especially in the case of those exposed to special risks in the course of their duties.

This paper ought to be consulted by every one engaged on the investigation of Rickettsiae. It contains a great deal of valuable information about the technical methods employed in the preparation of the vaccines and tells of the pitfalls connected with the various procedures.

Following are a few of the special points. Laboratory workers are exposed to great risks they must be protected by wearing rubber gloves and rubber aprons and by working from behind a sheet of glass. The source of *R. mooseri* is the brain of a mouse infected by the intraperitoneal route only mice in which Rickettsiae have been found in smears made from the peritoneum are used. *R. prowazeki* was obtained from the brains of infected guinea-pigs. Of 11 series of egg-yolk inoculations with this organism six failed altogether. Of the remaining five one died out after seven egg-passages, another was used for 11 passages but was abandoned because few Rickettsiae were found another became contaminated with bacteria after 19 passages the other two were still active after 16 and 44 passages respectively. Yolk sacs heavily infected with *R. prowazeki* were shaken for 24 hours, filtered through gauze and heated for an hour at 52° to 54°C. they were then tested for bacteriological purity and made up in a suspension with carbolyzed Ringer's solution. The final product which consisted of 5 to 10 per cent of yolk sac was kept for four weeks. Fresh suspensions caused rather severe reactions (see also BERGE and HARGETT below p. 688). Yolk sacs from embryos which had died were not used. No method of titration of the vaccine has yet been worked out and the dosage is not mentioned.

The fertility and hatching rate of the eggs employed were better from April to August than during the rest of the year. [Compare this method of preparation with that described by Cox, this *Bulletin* 1942 Vol. 39 p. 381.]
John W. D. Meyer

FINDLAY (G. W. M.) Control of Rickettsias: Immunization against Infection.—*Lancet* 1942, Apr. 18, pp. 483-484 [17 refs.]

A brief account of the methods attempted, all of which have been noticed in this *Bulletin*.
C. W.

Lancet 1942, Apr. 23, pp. 506-507—Typhus Immunization. [17 refs.]

BARTONELLOSIS

GARCIA CABALLERO (Antonio) & MAYORAL (Pedro). La bartonellosis humana o enfermedad de Carrion en Chile. [Carrion's Disease in Chile.—*Patol. Lab. Hig. Varillo* Porto. 1940-41 pp. 181-185]

This is an interesting paper. The authors refer to four patients with nodular growths which had been diagnosed as von Recklinghausen's disease. The swellings ranged from the size of a lentil to that of a

kidney bean scattered generally over the body. Having a suspicion as to the nature of these small tumours they excised one and found none of the pathological changes of von Recklinghausen's disease but those characteristic of verruga peruana. Examination of the blood did not discover any Bartonella. They speak of five forms of Bartonellosis

H Harold Scott

GROOT (Hernando) MAYORAL (Pedro) & MARTINEZ (Luis Eduardo) Bartonellosis y fenomeno de Mooser [Bartonellosis and the Mooser Phenomenon.]—*Publ Lab Hig Nariño* Pasto 1940-41 pp 39-42. With 2 figs.

The Mooser phenomenon is given irregularly in inoculation of guinea pigs with blood of patients with Bartonellosis or with cultures of the organism obtained from patients. If present it is fairly well marked by the third day, reaches a maximum in a little over a week and disappears in another 7-10 days. The authors inoculated 37 young animals: 4 with 1 cc, 4 with 3 cc, 2 with 4 cc, 15 with 5 cc, and 12 with 6 cc. Eight showed the scrotal reaction: six on the third, two on the fourth day. The blood of a patient inoculated into 11 guinea-pigs produced the reaction in one, not in the others. 5 cc were used. In another case of four inoculated two reacted. It was never observed if less than 3 cc. was injected.

H Harold Scott

GROOT (Hernando) MAYORAL (Pedro) & MARTINEZ (Luis E.) Resumen de observaciones y estudios sobre bartonellosis [Studies in Bartonellosis.]—*Publ Lab Hig Nariño* Pasto 1940-41 pp 9-38. With 6 figs.

A general paper on the subject of Carrion's disease dealing with cultivation of Bartonella, the results of inoculation, the formol-gel and flocculation reaction, the blood changes, histology of the nodules, diagnosis and treatment including prophylaxis. It contains nothing beyond what is to be found in modern text-books.

H Harold Scott

YELLOW FEVER.

SAWYER (Wilbur A.) La fiebre amarilla en las Américas. [Yellow Fever in the Americas.]—*Bol Oficina Sanitaria Panamericana* 1942. Apr. Vol. 21 No 4 pp 320-334. With 1 map [16 refs]. English summary.

After noting that the outstanding characteristics of the historic yellow fever picture were sudden epidemic extensions of the disease far beyond known endemic foci followed by absence of the disease or relative quiescence, the author discusses the outstanding features of the yellow fever situation in the Americas: (1) absence of definite outbreaks of urban aegypti-transmitted yellow fever anywhere; (2) absence of recognized yellow fever of any transmission type outside of South America; (3) jungle yellow fever endemic and as migrating epidemics in wide areas of the interior of South America; (4) effective

methods for keeping cities non-infectible through *Aedes aegypti* control and (5) a safe and effective way to immunize against yellow fever and prevent its spread from the jungle to infectible cities. The results of the world-wide yellow fever immunity surveys carried out since 1931 by employing mouse protection tests of human sera are summarized for the Americas showing among other things that yellow fever may have existed in Mexico as late as 1925 in El Salvador to 1924 in Costa Rica to 1910 and possibly as late as 1877 in Panama. The author observes that if yellow fever exists in Central America it will probably be found in the San Blas region of Panama close to South America, and a cooperative program including vi-cerotomy protection tests and supplementary studies is being carried out by the Panama Government and the Rockefeller Foundation. While the reader is referred to the reports of Soper for complete information on jungle yellow fever in South America mention may be made of the fact that the wild Brazilian forest mosquitoes *Aedes leucoceraeus* and *Haemagogus carnicornis* have been observed to contain yellow fever virus and to be capable of infecting rhesus monkeys by biting and also of the apparent hitting of epidemics from one region to another in both Brazil and Colombia.

As to prevention, the author commends the *Aedes aegypti* control work (begun by Gorgas and Oswaldo Cruz) carried out in American cities, and recalls that this control, by keeping the city of Rio de Janeiro non infectible possibly prevented a serious epidemic of yellow fever in 1936 following the entrance into that city of four persons infected in the jungle areas. The chief features of these control methods as described by Soper include the weekly inspection of premises for *A. aegypti* larvae the destruction of breeding places and the search for additional mosquitoes by special squads with finding and destruction of breeding foci if mosquitoes are found the application of petrolum (3 parts fuel oil and 1 of kerosene) is recommended as being more effective than merely emptying out the water. Breeding has been greatly reduced by such methods that in many cities it has been possible to lower the cost of the service by lengthening the period between house inspections. The author remarks that while the urgency of precaution increases with the proximity to jungle yellow fever the critical distances have been greatly extended by the increased rapidity of travel especially by airplane, and that cities and towns through which yellow fever must pass in order to spread from jungle areas or to invade an uninfected country have a special responsibility for keeping themselves non-infectible. Authorities must be able to recognize yellow fever immediately if it should appear particularly if adequate steps have not made their cities non-infectible. While the clinical diagnosis may sometimes be all that is possible before the first precautionary measures have to be taken the final identification may be facilitated by such modern diagnostic aids as (a) in mild cases drawing of blood as early as possible during the acute disease and again three weeks after onset and examining both sera by means of the mouse protection test if the first specimen does not protect against yellow fever and the second does the case was yellow fever whereas if neither or both specimens give definite protection the illness must have been some other disease. (b) in more serious investigations attempts to isolate the virus from cases during the first three days of illness by injecting blood serum from the sick person intracerebrally in amounts of 0.03 cc. into six susceptible mice taking great care to prevent

infectious blood from coming into contact with the hands of a non-immune investigator and (c) in fatal cases securing of a specimen of liver by autopsy or viscerotome puncture sending it in 10 per cent formalin to a pathologist acquainted with yellow fever lesions. Determination of yellow fever in an individual case should be merely one step in the thorough epidemiologic investigation of an outbreak.

While cities may be kept free of infection by *Aedes aegypti* control, vaccination is the only measure practicable against jungle yellow fever. To date it has been applied on a large scale mostly to stop an existing epidemic or to immunize against an expected one. In Colombia much thought is being given to the immunization of selected communities to prevent the possible future spread of nearby jungle yellow fever through them and at the same time vaccination is made available to the usually few people under actual exposure in jungle areas—an important measure for it is the non-immunes working in the jungle who will become infected and bring yellow fever into the towns. While the vaccine (17D) now used in the Americas is both safe and effective experience has shown that eternal vigilance is needed to keep this living vaccine at a low level of virulence and free from contaminating virus and at the same time to avoid any fall in immunizing power. The use of chick embryo tissues in place of brains of living mice in producing the vaccine has increased the element of safety by reducing the risk of introduction of an unknown pathogenic virus. The possibility of the introduction of an unknown virus into the vaccine from the blood of apparently healthy human donors is being dealt with by inactivating with heat the human serum used in the tissue cultures. Any reports of jaundice or other symptoms following vaccination are being carefully investigated. Following demonstration of the ineffectiveness of certain lots of living virus vaccine which had undergone over 300 passages in tissue culture whereas viruses passaged only from 229 to 255 times had been very successful, experimental tests of the effects of passage are being made in Colombia, New York and Brazil and new lots of vaccine are first being tested on small groups of people before being used in the field.

LEWIS (D. J.) HUGHES (T. P.) & MAHAFFY (A. F.) **Experimental Transmission of Yellow Fever by Three Common Species of Mosquitoes from the Anglo-Egyptian Sudan.**—*Ann Trop Med & Parasit* 1942 June 30 Vol. 36 Nos 1 & 2 pp 34-38

Three species of *Aedes* *A. taylori* Edwards *A. metallicus* Edwards and the pale form of *A. aegypti* L. all common in the Sudan were transported from there to Entebbe where experiments were carried out to see if they could transmit yellow fever.

Rhesus monkeys were infected with the Asibi strain of the virus and when they showed a temperature of 104°F or more batches of the mosquitoes were fed on them and after periods varying from 8 to 9 days at 24 to 26 C. allowed to bite normal monkeys. In nine cases rhesus monkeys were used and all the animals became infected and died of yellow fever and in the other two experiments *Cercopithecus* monkeys were used and both became immune.

It is evident that all these species are efficient carriers and *A. taylori* and *A. metallicus* are abundant in the Nuba mountains where yellow fever occurred in epidemic form in 1940. [See KIRK, this *Bulletin* 1942 Vol. 39 p 69] E. Hasdell

SMITH (E. C.) *Hepatic Findings excluding Yellow Fever in Fourteen Cases of Jaundice in West Africa.*—*Ann Trop Med & Parasit* 1942 June 30 Vol. 36 Nos. 1 & 2 pp 38-46 With 10 figs. on 5 plates [12 refs]

Clinical and histological notes of 14 cases clinically suggestive of yellow fever. In six of these cases the histological findings were considered to be those of subacute necrosis. The occurrence of extensive Councilman lesions, of calcified cysts and of sicklaemia is also noted in some of the cases.

The author gives details of all these cases in which knowledge of the aetiology of the conditions is practically nil. They are of especial interest as exemplifying the variety of conditions producing changes in the liver which are liable to cause confusion in the diagnosis of yellow fever.

E Hindle

BERGE (T O) & HARGETT (M V) *Anaphylaxis in Guinea Pigs following Sensitization with Chick-Embryo Yellow Fever Vaccine and Normal Chick Embryos.*—*Public Health Rep* 1942 May 1 Vol 57 No 18 pp 652-667 With 2 figs. [19 refs.]

The increasing use of vaccines prepared from fowl embryonic tissues and the probability of repeated injections of these products into human beings lends a special interest to the results of this investigation on the production of an anaphylaxis in guinea-pigs following the injection of fowl embryo yellow fever vaccine and of normal fowl embryo tissue.

"In general the method of preparation of these vaccines was similar in all essentials. Eggs were incubated for 7 to 11 days and the living embryos inoculated with the 17-D strain of attenuated yellow fever virus developed by THEILER and SMITH. After an additional incubation for 3 days, the still living embryos were removed aseptically from the shells and ground to a fine pulp in blenders cooled with dry ice. If a diluent was to be used, either normal human serum or distilled water was added, or in the case of 100 per cent embryo vaccines, no diluting fluid was employed. These preparations were then centrifuged in an angle centrifuge at from 3,500 to 3,700 r.p.m. for 30 to 60 minutes to remove tissue debris. The supernatant extract constituting the finished vaccine was dispensed in ampoules frozen in a dry ice-alcohol mixture and stored at minus 23°C.

The author injected guinea-pigs some with an aqueous base and from 10 to 14 day old fowl embryos some with an aqueous base and others with a human serum base. Sensitization experiments were also done with 8 to 14 day old normal fowl embryo extracts. A sensitizing dose of 0.05, 0.1 or 0.2 ml. of the various antigens was given subcutaneously, and after an interval of 21 to 23 days, a challenging dose of 0.1 or 0.2 ml. The results show that the percentage of animals showing anaphylaxis increases with the age of the embryo used as antigen, and doses which sensitize guinea-pigs against 14-day material fail to produce sensitization against 10-day extracts. If these results are applicable to human beings, the probability of sensitization with biological products prepared from fowl embryos would be greater when 13 or 14 day embryos are used than when younger embryos are employed.

E Hindle

PLAGUE.

MOLL (Aristides A) & O'LEARY (Shirley) *Plague in the Americas*
 IX. Uruguay—*Bol Oficina Sanitaria Panamericana* 1942
 Mar Vol 21 No 3 pp 245-252. With 1 map & 1 chart
 [Refs in footnotes.]

URUGUAY—It is currently accepted that Uruguayan waters with the arrival of the *Zeter* out of Rotterdam with a cargo of rice in 1899 were the scene of entry of plague into South America. It was not however till 1901 that rats in Montevideo were found infected and a human case at the same time. The usual sequence of plague in rats before its appearance in human beings has frequently been observed in Uruguay. Human plague has been mainly bubonic although some cases of pneumonic and some of septicaemic plague have been reported. Both vaccination and serum therapy have been used in combating outbreaks.
 W F Harvey

JUNIOR (Marcello da Silva) *Pasteurella pestis* Infecção pestosa nos roedores e em outros animais. Peste e tularémia [*Pasteurella pestis* in Rodents and Other Animals. Plague and Tularemia.]—*Folha Med* 1942 Jan 5 Vol. 23 No 1 pp 4-11 With 1 chart

These are notes of the course of lectures given at the Institute of Public Health of Oswaldo Cruz. They set out all the bacteriological characters of the plague bacillus fully and systematically. Tularemia is treated similarly but with special reference to its resemblances to plague.
 W F Harvey

PLUM (D) *The Plague Epidemic in Nairobi, with Special Reference to Place Incidence and Treatment.*—*East African Med J* 1942 Apr Vol 19 No 1 pp 3-9

During a period of 12 months 547 cases of plague were admitted to the two civil hospitals of Nairobi—the Native Civil Hospital and the Infectious Diseases Hospital. The Native Civil Hospital dealt with 134 of the cases chiefly pneumonic or septicaemic and 127 died. Of the 413 cases at the Infectious Diseases Hospital 13 were septicaemic (11 showed bacilli in a thin blood smear) and 12 pneumonic there were only 227 deaths. Treatment at both hospitals was by Dagenan (M & B 693 sulphapyridine) and the author concludes from his clinical experience that Dagenan if used in sufficiently large and frequent doses in an early case of bubonic plague acts almost as a specific. The average dosage was four tablets [each of 0.5 gm.] on admission and then two tablets every two hours until the temperature remained normal for 24 hours.
 W F Harvey

VINT (F W) *The Pathology of Plague.*—*East African Med J* 1942 Apr Vol. 19 No 1 pp 9-14

Although gerbils and other field rodents do suffer from plague it is the house rat which is primarily responsible everywhere for human plague epidemics and in Kenya there is no evidence to show that any wild animals other than rats harbour plague [see this *Bulletin* 1939 Vol. 38 p 965]. It is a mistake to classify plague into the separate
 (1942) C

forms of bubonic septicaemic and pneumonic. Thus in bubonic plague there is an initial if transient bacteraemia and always a terminal septicaemia while pneumonic plague ends by becoming septicaemic. Post mortem examinations show extravasations of blood of a jet black colour which contrast with the bright red colour in other septicaemic conditions. The liver shows tiny miliary abscesses, slightly yellowish and consisting of necrotic liver tissue with plague bacilli.

Some practical points are recorded at the end of the article (1) It is useless to examine for plague rats which have been caught in a baited trap. The plague rat is sick and is not attracted by food into a trap. (2) Dead rats, in which plague bacilli may most readily be found, are often decomposed. In that case bone marrow smears should be examined.

W. F. Harvey

DE SMIDT (F. P. G.) The Laboratory Diagnosis of Plague Infections.—*East African Med. J.* 1942 Apr. Vol. 19 No. 1 pp. 15-25.

Buboes—The material taken must be from the gland substance itself and not from the surrounding oedematous tissue. It is advisable to aspirate in several directions because the bacilli are not uniformly distributed throughout the gland. If suppuration has taken place plague bacilli may be absent microscopically.

Blood—Growth in blood culture should be apparent in 48 hours and the Gram-negative bacilli which are non-motile, should not be confused with the actively motile typhoid or *Salmonella* organisms.

Sputum—A pair of pneumococci may be mistaken for a plague bacillus with its bipolar staining. Friedländer's bacillus may bear a close resemblance to *P. pestis* even to a very perfect bipolar staining. Cultivation easily differentiates the two organisms and plague bacilli in sputum are characteristically present in abundance contrasting with the sparseness of Friedländer bacilli.

Post Mortem tissues—Smears should be made from the spleen and from all enlarged glands that can be found. Care must be taken not to mistake the central spore of a putrefactive organism for the bipolar staining of a plague bacillus. All such spore-bearing organisms are Gram-positive.

Rats—The typical post mortem signs are an enlarged, engorged dark, friable spleen; red serous membranes of dull lustre with petechial or diffuse haemorrhages; blood-stained fluid in the pericardial, pleural and peritoneal sacs; enlargement of the suprarenals; enlargement and engorgement of the liver sometimes with white miliary foci of necrosis; enlargement of glands, especially in the cervical region.

W. F. Harvey

DOWDSEWELL (R. M.) Plague Vaccine.—*East African Med. J.* 1942 Apr. Vol. 19 No. 1 pp. 28-29.

WRIGHT (F. J.) Some Unusual Clinical Manifestations of Plague.—*East African Med. J.* 1942 Apr. Vol. 19 No. 1 pp. 29-33.

These unusual clinical manifestations of plague were (1) The tonsillar and pharyngeal type in which such diagnoses as diphtheria, follicular tonsillitis or Ludwig's angina may be made. (2) The cutaneous type in which skin and subcutaneous tissues are involved. (3) The cerebral type with symptoms, such as delirium or unconsciousness, pointing to a brain lesion.

W. F. Harvey

GOLDSTEIN (G) *Clinical Aspects of the Lung Complications of Plague.*—*East African Med J* 1942 Apr Vol. 19 No 1 pp 33-38

There is little doubt that the diagnosis of pneumonic plague may be difficult. Such symptoms as dyspnoea increased frequency of respiration cough of dry type by the second day becoming loose with free expectoration of blood-stained sputum are among those mentioned. The most characteristic sputum is thin bright red and contains large numbers of plague bacilli. In the earliest stages there may be little to suggest pneumonic plague except a marked discrepancy between almost negligible physical signs and the gravity of the patient's condition. And yet these symptoms are not to be regarded as invariable they may be absent altogether. Sputa may not contain bacilli patients may complain of abdominal pain so as to suggest an acute abdomen. The pulse rate may be remarkably low and the respiration rate may not exceed 36 to 40. Most patients looked very ill, some were prostrate but also from this rule there were remarkable exceptions. Instead of being thin the sputum may be sticky and mucopurulent. With regard to prognosis conclusive evidence of pulmonary involvement as shown by positive sputum or lung puncture is of very grave significance. *W F Harvey*

ALVARADO (Carlos Alberto) *Procedimiento sencillo para el diagnóstico bacteriológico post mortem de la peste humana.* [A Simple Procedure for the Post Mortem Diagnosis of Human Plague]—*Bol Oficina Sanitaria Panamericana* 1942 Feb Vol. 21 No 2 pp 129-132 English summary

The post mortem diagnosis of plague in isolated regions remote from medical services presents a problem not entirely solved by the usual methods of obtaining material for diagnosis removal of a piece of infected tissue or rib or by viscerotomy or visceral puncture. All of these methods require special instruments and a high degree of skill. These difficulties may be overcome by the simple procedure of cutting off a finger (the forefinger being the easiest to amputate) since the marrow of the phalanx invariably contains a sufficient quantity of germs for the identification of *B. pestis* when the patient has died of plague. The finger is disinfected with alcohol and then removed with any type of knife. Rubber gloves are not necessary. The small wound on the hand of the corpse may be covered with cotton dipped in formalin and a bandage or the hand may merely be placed beneath the clothing. The amputated finger is placed stump down in a clean bottle or other container which need not be hermetically sealed since a small piece of absorbent cotton placed in the bottom will absorb any fluid. At the laboratory the usual technique is then followed, although the extraction of the phalangeal may be more difficult than that of rib marrow due to its smaller size and hard bone. If the cross section does not provide enough material the bone may be opened lengthwise.

Use of this procedure is suggested in organized plague work along lines similar to those of viscerotomy service. Through compulsory digitotomy in all cases of persons dying of an acute illness of less than 10 days duration early discovery of new foci, and recognition of clinically atypical cases are possible.

CHOLERA.

BHATTACHARYA (A. K.) & GUPTA (B. P.) Studies in the Last Cholera Epidemic at Moradabad.—*Jl Indian Med. Assoc.* 1942. Mar Vol. 11 No 6 pp 177-180

The epidemic of 59 cases in 1940 with 35 deaths occurred, as it usually does in Moradabad, during the rainy season. Deficient rainfall (29.6 inches) had been the experience in 1939 and the rainfall of the year 1940 itself was 40.35 inches. A table of 29 cases is given with details of age, sex, treatment by either intravenous or subcutaneous salt solution, occurrence of uraemia and final result. There were nine deaths. Two of the patients were pregnant and recovered without abortion. Treatment by the mouth was mainly by large quantities of laolin in luke-warm water. This was given to most of the patients in addition to the salines. H. F. Harvey

GHOSE (H.) & MUKERJEE (S.) Presence of *B. coli* Agglutinin in Serum of Cholera Cases and the Possible Role of *B. coli* in Cholera.—*Ann. Biochem. & Experim. Med.* Calcutta 1941. Mar Vol. 1 No 1 pp 89-100

It has been observed that when sterile filtrates of cholera stool are injected into rabbits considerable amounts of *Bact. coli* agglutinins are found in their sera. This led the authors to the supposition that *Bact. coli* might undergo autolysis in the alkaline intestinal contents in the early stages of cholera and that the products of this autolysis might be absorbed and play a part in aggravating the symptoms. Blood and stool were collected from convalescent cholera patients, *Bact. coli* were isolated and agglutination tests carried out against the autogenous *Bact. coli* and against an Inaba strain of *V. cholerae*. In 35 cases all the bloods agglutinated *V. cholerae* and 25 agglutinated autogenous *Bact. coli*; in 50 healthy controls only 14 agglutinated autogenous *Bact. coli*; in 20 patients with typhoid only six agglutinated autogenous *Bact. coli*. From these results it is clear that the sera of the cholera patients contained more agglutinins for *Bact. coli* than those of the other groups and this lends *prima facie* support to the authors' views. C. IP

BACILLARY DYSENTERY

MACUMBER (Harold H.) Acute Bacillary Dysentery. A Clinicopathologic Study of Two Hundred and Sixty Three Consecutive Cases.—*Arch. Intern. Med.* 1942. Apr. Vol. 69 No 4 pp 624-635. With 5 charts.

During the past 11 years 263 cases of acute bacillary dysentery have been recorded at the Gorgas Hospital. All diagnoses were confirmed by cultures from faeces.

Males outnumbered females almost 2:1. Negroes predominated (57 per cent.). Convulsions were reported in eight children, with high fever. Abdominal tenderness was present in 52 per cent., distension rarely. Total white blood cell and differential counts varied widely.

In 90 per cent leucocytes were between 4 000 and 13 000 the average being 8 760. Organisms recovered from stools Flexner 91 per cent Sonne 6.5 per cent. No Shiga infections were encountered. Poly valent serum was given in 52 per cent but failed to reveal any concrete evidence of therapeutic value.

The mortality of this series was 6.5 per cent, it was greatest amongst the aged (40 per cent.) and next in children (15-20 per cent.) In those aged 6-60 the death rate was only 2.4 per cent. The death rate in Sonne infections was greater than that in Flexner cases.

P Manson Bahr

COMPTON (Arthur) **Results of Bacteriophage Treatment of Bacillary Dysentery at Alexandria. A Statistical Retrospect.**—*Brit Med J* 1942, June 13 pp 719-720 With 2 figs.

In this (abridged) paper are presented the results of a statistical investigation of the mortality rates from dysentery from 1928 to 1940. The results are shown in the accompanying graph. In Alexandria phage therapy has been extensively employed in Cairo and the rest of Egypt phage therapy is either not used at all or on a very much smaller scale than in Alexandria. In all these figures for dysentery there is no differentiation in official statistics between bacillary and amoebic infections but it is considered that the incidence of amoebic dysentery and the use of emetine in treatment are so constant

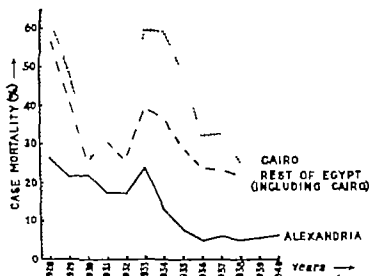


FIG. 1—Case mortality from dysentery in Egypt for 1928-40

[Reproduced from the *British Medical Journal*]

throughout that they can be disregarded. During the same period the case mortality from typhoid has shown no decline. The author maintains that the fall in case mortality in Alexandria, compared with the continuing high case mortality elsewhere in Egypt reflects the value of phage treatment.

In Alexandria it has become the established custom to treat bacillary dysentery or acute enteritis with 20 cc bacteriophage as soon as possible and thereafter the same amount every 4 hours the patient being in bed and taking Vichy or Evian water only for 24 hours.

In a previous paper [this *Bulletin* 1942, Vol. 39 p. 36] the author stated that a good dysentery and meta-dysentery phage preparation, alternating with a like ampoule of a good *Salmonella* and coliform phage preparation every four hours was used. C IV

LYON (George M) Chemotherapy of Acute Bacillary Dysentery—*Southern Med. J.* 1942 June. Vol 35 No 6 pp 606-611

INTESTINAL PROTOZOAL INFECTIONS.

O'DONOVAN (D K) McGRATH (John) & BOLAND (S J) Giardial Infestation with Steatorrhoea.—*Lancet* 1942, July 4 pp 4-6. With 2 figs. [10 refs.]

The case described is that of a boy 9½ years of age whose chief complaints were retardation of growth, attacks of diarrhoea with bulky and pale stools, persistent craving for sugar and relatively enormous appetite vague abdominal pains particularly in the left iliac fossa. The patient was undernourished. Examination of the abdomen by X rays showed deformity of the mucous-membrane relief of the lower part of the small intestine. Analysis of the stool showed excess of fat crystals. A diagnosis of steatorrhoea was made. Since in a previous fatal case of this condition in a man, large numbers of giardia and widespread destruction of the epithelium of the small intestine had been discovered at post mortem examination search for the flagellate was made in the case of the boy. It was only after the administration of a strong saline purge that numerous cysts were found in shreds of mucus in the stool. During the weeks following the purge the diarrhoea subsided, while microscopically the stools became normal. Flagellates were not again found, even after administration of a purge. Twelve months later there had been no return of diarrhoea or abdominal pain. There was no change however in the intestine as revealed by X-ray examination. It is concluded that some cases of so-called idiopathic steatorrhoea may have been due in the first place to injury of the intestinal epithelium by a transient giardial infection.

[Unfortunately little evidence is available that the giardia, which inhabit the upper parts of the small intestine, were responsible for the condition of the intestine or the steatorrhoea in either of these cases.]

C M Wemyss

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

ROBINSON (G G) The Penetration of Pyrethrum through the Cuticle of the Tick, *Ornithodoros moubati* Murray (Argasidae).—*Parasitology* 1942 May Vol 34 No 1 pp 113-121. With 3 figs. [12 refs.]

This paper forms part of a study of the action of insecticides on the tick *Ornithodoros moubati*. When the larva of this tick has emerged from the egg it remains motionless for about four days, after which the

first moult takes place. If the immobile larva is immersed in or sprayed with oil containing pyrethrum it soon begins to move the legs. The rapidity with which this response occurs has been used by the author as a measure of the rate of penetration of pyrethrum through the cuticle. Thus it is found that except with concentrated solutions there is a logarithmic relation between concentration and the speed of entry—that penetration is slower as the larva gets older probably because the cuticle increases in thickness and that mineral oils induce swifter penetration than vegetable oils.

V B Wigglesworth

VARGAS (Luis) & ZOZAYA (José) La sulfadiazina la sulfapyridina y la sulfanilamida en la infección experimental del ratón por *Borrelia recurrentis* [Sulphadiazine, Sulphapyridine and Sulphanilamide in Experimental *S. recurrentis* Infections]—*Rev Inst Salubridad y Enfermedades Trop Mexico* 1941 Dec Vol. 2 No 3-4 pp 303-310 English summary (8 lines)

1 Sulphadiazine, sulfapyridine and sulfanilamide did not modify the experimental infection in mice with a strain of *Borrelia* [*Spirochaeta*] *recurrentis* recently isolated in the city of Aguascalientes.

2 The dosage of sulfadiazine and sulfapyridine was 45 mgs daily and sulfanilamide 40 mgs. In both cases the dosage was close to its lethal value.

3 We failed to infect mice orally using titrated spleen, liver and heart suspended in Locke-fluid.

BROWN (Thomas McP) & NUNEMAKER (John C) Rat-Bite Fever. A Review of the American Cases with Revaluation of Etiology, Report of Cases.—*Bull Johns Hopkins Hosp* 1942. Mar Vol. 70 No 3 pp 201-327 With 3 text figs. 3 charts & 36 figs on 10 plates.

A comprehensive review of the problem of rat-bite fever in the U.S.A. with special reference to the relative importance of *Spirillum minus* and *Streptobacillus moniliformis* as the aetiological factor.

A general historical résumé of the subject is followed by an account of rat bite fever due to *Spirillum minus*—Sodoku—in which attention is again directed to the many possible sources of error in its diagnosis, especially the natural occurrence of spiral organisms in laboratory mice, rats and guinea-pigs. The authors recommend that all animals used for diagnostic tests should be examined at least twice before inoculation and when mice are used four should be inoculated and a second group of four kept as controls and re-examined if the inoculated group becomes infected.

The cases of Sodoku in the United States from 1916 up to the end of 1940 including only those from which an aetiological agent has been recovered, number 125 and are given in tabular form. This table extends Bayne-Jones's list and includes 40 cases reported for the ten years from 1931 to 1940.

These cases have been diagnosed mainly on clinical grounds and in only 17 has the spirillum been demonstrated by animal inoculation. In only 11 out of these 17 was rat bite definitely the cause, the others being the result of mouse-bite, contact with dogs, cat-bite or cat scratch and trauma without any known animal contact. Out of the total number of 22 cases of spirillary rat bite fever, serological tests

for syphilis in 17 patients gave 10 positive and 7 negative but when 4 cases in which diagnosis was not confirmed by animal inoculation are eliminated it is found that only 7 of the 13 gave positive serological tests for syphilis.

The authors then consider the 104 cases of artificially induced infection by inoculation in the entire English literature devoting especial attention to the 72 cases described by HERSHFIELD *et al* [see this *Bulletin* 1929 Vol 26 p 675]. Arthritis developed in 18 of these 72 cases the elbow and ankle being most commonly involved.

The authors next discuss the history of *Streptobacillus moniliformis* which has been described under various names including *Haverhillia multiformis* and *Achnomyces muris*. It was originally described by Schottmüller (1914) as *Streptothrix muris rath* and the organism was cultured from the blood of a patient suffering from rat-bite fever. This name would seem to have priority but the authors prefer the term *Streptobacillus moniliformis* since this has been used in all the more important research work on the subject. The varied nomenclature has resulted in a confusion of different infections and the authors tabulate 22 examples of various names and sources of this organism.

A discussion of Haverhill Fever unassociated with rat-bite [see *Bull of Hyg.*, 1935 Vol. 10 p. 251] in which 86 cases occurred and the infection was traced to unpasteurized milk shows the many points of gross resemblance between this disease and Sodoku and it is impossible at the present time to draw any sharp lines of differentiation by means of clinical observations alone.

Three cases of rat bite fever from each of which *Streptobacillus moniliformis* was recovered by special culture media and technique are described in detail. Repeated dark field examination of the inoculated animals failed to reveal *Spirillum minus* and in each of the cases the serum agglutinated the *Streptobacillus* in high titres (up to 1:5120). Five additional cases are also described in which *S. minus* was absent but *Streptobacillus agglutinans* were present. The specificity and value of this agglutination reaction has been confirmed by testing 120 normal human sera and also the sera of mice and guinea-pigs infected with *S. minus*. Each of the 3 strains of *Streptobacillus* isolated showed marked virulence for mice the type of infection depending mainly on the generation of culture used and the particular strain of mice inoculated. Arthritis was a striking feature of chronic infections. A gold preparation (sodium aurothiomalate) was found to protect mice against the infection, whereas sulphonamide drugs had no protective action.

The authors' evidence suggests that *Streptobacillus* infection is induced with much greater frequency by the bite of a rat than is infection with *S. minus*.

E Hinde

ROGLIANO (A. G.) Two Cases of Rat Bite Fever. *Surgery* 1942. Apr Vol 11 No 4 pp. 632-635. With 3 figs.

A description of two typical cases of rat bite fever in children treated at Grasslands Hospital New York. In one patient spirilla were found in the blood at the height of a febrile attack, and in the other patient mice were infected by blood inoculation. The intravenous administration of neocarsphenamine was followed by recovery in both cases.

E Hinde

YAWS

VARGAS CUÉLLAR (Pedro I) *El pian en la geopatologia en la Costa del Valle del Cauca. [Yaws on the Coast of the Cauca Valley]*—*Rev de Higiene* Bogota. 1941 Mar Vol. 22. No 3 pp 1-79 With 4 maps & 25 figs. [Bibliography]

The Department of the Cauca Valley is a part of the Republic of Colombia bounded on the north by the Calima river and on the south by the Rio Naya. This work is a thesis giving an account of the hydrography geology and the flora and fauna of the department the population and a dissertation on the characters and prevalence of yaws there. The author tells of the races affected, the sex and age clothing customs etc the meteorology and nature of the food and discusses insect transmission by *Ornithodoros* *Aedes aegypti* *Musca Hippelates pallipes* and other species staining of the spirochaete the symptomatology pathological anatomy and treatment. The thesis is illustrated by accounts of 24 cases and photographs of the lesions [the latter are poorly reproduced and some convey but little information. The thesis as a whole shows that the author has undertaken a serious piece of work and carried it out conscientiously] *H Harold Scott*

GONZALO GUERRA *El pian en el Litoral Pacifico Colombiano Como debe orientarse su campaña? [Yaws in the Coast Area of Colombia.]*—*Med y Cirugia* Bogota. 1940 Dec. Vol. 5 No 4 pp 155-156 158-160

LEPROSY

FAGET (G H.) *Pitfalls in Early Diagnosis of Leprosy*—*New Orleans Med & Surg J* 1942 Mar Vol. 94 No 9 pp 432-440 With 1 chart

The author records his experience in the Carville leprosarium in the U.S.A. where in ten Southern States there appears to have been a slight increase in leprosy. One thousand cases are thought by some still to be free in the States. Early diagnosis is important for the average patients admitted to Carville are fairly well-advanced, and many of them have been treated for months or years before correct diagnosis. This is largely due to lack of proper technique in examining cases for lepra bacilli. He discusses the diagnosis from syphilis rheumatism neuritis sinusitis tuberculosis and other diseases and records illustrative cases. He finally pleads for the family physicians to think more of the possibility of leprosy in the endemic areas of the U.S.A. *L Rogers*

DAVEY (T F) *Masked Lepromatous Leprosy A Clinical Note.*—*Leprosy Review* 1942 Jan.-Mar Vol. 13 No 1 pp 3-5

This is a report of an instructive case illustrating how easy it is to overlook an infectious case of lepromatous disease when the typical symptoms such as thickening of the ears face and body are absent. On stripping the subject the skin over the groins lower abdomen and

genitals was seen to be several shades darker than elsewhere and below this area ill-defined pale macules coalescing with each other fused with the pale skin of the lower extremities and the rest of the body making him resemble a pale-skinned person. Yet a bacteriological examination revealed numerous acid-fast bacilli in the skin of the body the nose and the ears

L. Rogers.

MOISER (B) Potassium Iodide as a Provocation Test in Leprosy. Experience of 244 Cases at Ngomahuru Leprosy Hospital, Southern Rhodesia.—*Leprosy Review* 1942. Jan.-Mar. Vol. 13 No. 1 pp 6-7

The author reports on a study of Muir's potassium iodide test in 244 leprosy cases in the course of two years. The drug was given once a week in the following doses 5 10 20 40 80 160 240 320 and 320 grains in a pint or more of water the test lasting nine weeks. In 198 cases no ill effects were observed, in 25 skin reactions only occurred in 4 there was a rise of temperature and in 19 there were both skin reactions and pyrexia. One patient died suddenly after 40 grains but post mortem examination was not performed. If reactions occurred the test was repeated after one to three months, and second or third tests were required in 23 cases. Of the total, 135 patients have been discharged and 85 are still under observation but not under treatment 34 of whom are still positive. Of these 34 positive cases, 25 passed the test which in them was unreliable. It should only be used in patients in good physical condition and, in spite of some unreliability is considered to be of value as a guide to discharge of cases.

L. Rogers

DHARMENDRA & LOWE (John) Studies of the Lepromin Test. 6. Results of the Mitsuda Test in Cases of Leprosy of Different Clinical Types.—*Leprosy in India*. 1942. Jan. Vol. 14 No. 1 pp 3-19 [12 refs]

This paper deals with the clinical results of the Mitsuda lepromin test in 680 cases in which the patients attended regularly for readings taken weekly till the sixth week. The result was classed as negative when the reaction was nil or if there was only slight induration up to 3 mm. in diameter without the formation of any nodule. A definite nodule at the site of the inoculation of lepromin from 3 to 4½ mm. in diameter was considered to be a weak positive result. Three grades of definitely positive reactions were recognized in which the diameter of the nodule was respectively 5 to 7½ mm. 8 to 10 mm. and over 10 mm. and often accompanied by ulceration. The following table summarizes the results in a convenient form —

Clinical description of the cases	Total Number	Negative	Weak Positive	Positive
		Percent	Percent	Percent
Leprosomatous	141	90	10	0
N ? L, Classification doubtful ..	51	60	32	8
Neural simple	112	22	35	43
Neural anaesthetic	33	9	18	73
Neural tuberculous	323	6	19	75

The lepromatous cases included 16 atypical cases with weak positive reactions in five—this left only 7 per cent of the typical lepromatous ones giving a weakly positive reaction. The neuro-macular cases of the Cairo classification were subdivided into—simple with 44 per cent tuberculoid (not major) with 73 per cent. and major tuberculoid 84 per cent positive so that plus reactions increase with the amount of activity as demonstrated by thickening of the lesions. Among the simple cases positive results were higher in the inactive arrested cases than in the active cases. In tuberculoid cases there was a higher proportion of positive results than in simple neural cases and a higher rate in the inactive than in active cases. The presence of leprosy bacilli in the lesions is associated with a higher incidence of negative and weakly positive reactions than in the bacteriologically negative cases. Thus in all types of leprosy the lepromun test is of some value in prognosis. The season of the year may have some influence on reactions—the authors propose to deal with this subject in a later paper

L. Rogers

LOWE (J) *Leprosy and Blood-Groups.—Leprosy in India* 1942, Jan Vol. 14 No 1 pp 23-25

This short note deals with the value or otherwise of blood-groups as evidence of familial predisposition to leprosy infection, a theory which has received some indirect support during recent years. After references to earlier work a study of blood groups in 200 typical neural and 200 typical lepromatous cases is recorded, and the percentages in each group and in the total cases in blood-groups O A B and AB is tabulated. The figures have been analysed statistically and no significant difference was found (a) between the cases of leprosy and the control group and (b) between the neural and lepromatous cases. This result is in agreement with the study by HASEGAWA of 1 400 Japanese leprosy cases and contrary to the assertion of PALDROCK that persons of blood groups O and A may be predisposed to leprosy

L. Rogers

CHATTERJEE (K R) *Notes on the Treatment of Leprosy with Diphtheria-Formol-Toxoid.—Leprosy in India* 1942 Jan. Vol. 14 No 1 pp 20-22

The author reports a trial of this treatment in eight lepromatous and two neural cases of leprosy. In two of the first group some improvement in clinical condition was at first noted, but this was not maintained. In three cases each injection was followed by bursting of nodules which healed later but in two of them new lesions also appeared. At the end of the treatment none of them was better and some were worse. Neither of the neural cases showed any improvement one of them in fact developed diffuse lepromatous infiltration. Nor was any improvement in the bacteriological condition of any patient observed. Most of the patients complained of weakness and in two cases severe eye complications developed. The sedimentation index showed no definite changes. The author concludes that no case showed any definite and lasting improvement and some were worse. He is therefore unable to confirm the claims of the Siam workers who introduced this treatment. [See also this *Bulletin* 1941 Vol. 38 pp 26 704 1942 Vol 39 pp 231 232, 462]

L. Rogers

FAGIT (C. H.) & JOHANSEN (F. V.) Diphtheria Toxoid Treatment of Leprosy. A Preliminary Report.—*Public Health Rep* 1942. Feb. 20. Vol. 57 No. 8. pp 249-253

The authors report on preliminary trials at Carville, U.S.A. of the diphtheria toxoid treatment advocated by COLLIER. Of 11 [7 12] patients who had persisted with the treatment up to the date of the report one (LJ) is slightly improved, three are in a stationary state and eight are in a worse condition than at the start of the experiment. A table shows that in 71 other patients the results in the control group of 35 were better than those of the group of 36 given toxoid. This failure is in accordance with all recent reports. L. Rogers

PERRIRA (O. de Loida) Vaccinotherapy in Leprosy.—*Med Bull Bombay* 1942. Jan 17 Vol 10 No 2. pp 45-49 [14 refs.]

The author gives brief notes of 11 cases illustrating the use of vaccines with a view to producing immunity from infection. After reference to some of the previous literature he states that he used the Vaudremer vaccine prepared by Sezary Levy and Bolger from cultures in *Aspergillus medium* of fragments taken aseptically from lepra nodules, and sterilized by iodine. He claims beneficial results, but his cases are not very striking and require confirmation. L. Rogers

PANDYA (B. C.) NARGUND (R. S.) & BOKIL (K. V.) Syntheses of Anti-Leprosy Drugs, Part I—a New Synthesis of α -Cyclo-Hexyl Undecyloic Acid, an Analogue of Dihydrohydnicaric Acid.—*Jl Univ Bombay* 1942. Mar Vol 10 Pt 5. pp 114-117

BOKIL (K. V.) & NARGUND (R. S.) Syntheses in the Chaulmoogric Acid Series, Part IV—Synthesis of di- Δ^2 -Cyclopentene- β -Propionic Acid—a New Homologue of Chaulmoogric Acid.—*Jl Univ Bombay* 1942. Mar Vol 10 Pt 5. pp 118-122

HELMINTHIASIS

SILVEIRA (Juvencio de Mello) Sobre a pesquisa de ovos de vermes pelo método de Hoffman Pons e Janer modificado [Search for the Eggs of Worms by a Modification of the Method of Hoffmann, Pons and Janer].—*Brasil-Médico* 1942. Mar 7 Vol 58. No 10. pp 107-108

The faeces of 100 children were examined and the results will be published later. Here the method is described. The author was seeking the eggs of *Schistosoma mansoni* but wished to devise a method suitable for the eggs of all the commoner parasites and for the faeces encountered in his district which often contain alkaline earths, especially calcium tinged with bilirubin. These make faecal examination difficult.

Fülleborn's method and the method of Hoffmann, Pons and Janer are both good for finding the eggs of *S. mansoni*. Fülleborn emulsifies a small quantity of faeces in 2-5 per cent solution of NaCl, leaves it to sediment and adds warm distilled water to the sediment when in

a strong light, the miracidia can be seen with a lens after their escape from the eggs. Hoffmann, Pons and Janer take 2 gm. of faeces in 10 cc. of water leave it for 10-20 minutes to break up stir and add 20 cc of water. The emulsion is then put through a metal screen of 80-100 meshes per sq. cm. and collected into a conical urine glass to sediment. After decanting the supernatant fluid 50 cmm. of the sediment are taken up with a graduated pipette and examined on a slide with a cover glass and high power of the microscope.

Senra's modifications are (1) to take more faeces (3-4 gm.) to increase the chances of finding eggs in light infestations (2) to re-emulsify the sediment in the urine glass in water stirring it well (3) to sediment again for 5-30 minutes and decant the supernatant fluid he examines only 4-5 drops of the sediment (0.3-0.4 cc.) on a slide without a cover glass (4) he does not use a pipette but vigorously shakes the urine glass with a circular motion after decanting the supernatant fluid and pours the drops to be examined on to the slide spreading them with a match or a toothpick. He claims that this method is better with faeces containing bilirubins because these deposit first and the schistosome eggs are most numerous in the layer just above the intestinal sand though some are mixed with it for this reason pouring off the drops to be examined is better than the use of a pipette. Further a low magnification of the microscope or a lens are sufficient for the examination. More transparent preparations are obtained and the method can be used as a routine. *G Lapage*

GELFAND (Michael) *The Diagnosis of Bilharziasis in Southern Rhodesia.*—*Trans Roy Soc Trop Med & Hyg* 1942. Mar 6 Vol. 35 No 5 pp 281-288

Bilharziasis is a chronic inflammatory disease. The symptoms and signs may therefore be general or constitutional such as fever loss of weight, lassitude an increased blood sedimentation rate or a blood eosinophilia.

Involvement of certain organs such as the liver and spleen, appendix, Fallopian tubes testis and especially the bladder and bowel should always make one consider the possibility of bilharziasis in this territory.

Among the cited cases the following features were noted loss of weight periodic haematuria no ova in urine lesions evident on cystoscopy permanent relief after antimony treatment. Dysentery in which amoebae were never found in the stool nor were ova of *S. mansoni* while the stool consisted of blood and mucus only but when this attack passed off many ova were present in the faeces. Constipation loss of weight easy fatigue no ova in urine or faeces but an eosinophilia of 13 per cent. re-examination of both excreta resulted in ova of *S. mansoni* being found in faeces after intravenous antimony lassitude disappeared and the patients put on weight. A girl of 27 working on infected snails began to lose weight eosinophilia rose no ova were found in urine or faeces (it probably being too early for them) she was given antimony with dramatic result. A native laboratory boy had epigastric pains after food lost much weight ova of *S. haematobium* were found in the urine and he recovered after treatment. An army sergeant supposedly malingering or neurotic had lost appetite weight and energy and became rather thin the spleen was enlarged there was no eosinophilia the blood sedimentation rate was rather raised to 7.5 per cent. ova of *S. mansoni* were found in the stool.

and his health improved considerably after antimony. As pendants to the last are first a boy of 12, a great swimmer eosinophils 3 per cent B.S.R. 10.3 per cent ova of *S. haematobium* in urine second a man of 23 B.S.R. 1 per cent. eosinophils 17 per cent. only after repeated examinations were ova of *S. mansoni* found in the stool. Lastly a native boy of 14 with loss of weight and general pains swinging temperature enlarged spleen no malaria parasites quinine was useless urine and stools contained schistosome ova, and after hesitation he was given antimony his temperature settled and health improved.

Clayton Lane

SOUZA LIMA (Jacinto Soares). Alguns aspectos da esquistosomose em Minas [Schistosomiasis in Minas Geraes].—*Folia Med.* 1941 Mar 5 Vol 22 No 5 pp 52-53

The author gives a general text-book account of the forms of *Schistosoma* which occur and especially of those known to infect man—*S. haematobium*, *S. mansoni* and *S. japonicum*. He then quotes from laboratory and other reports to point out that in some parts of Minas Geraes the incidence [i.e. the findings from examination of stools for ova] ranges from under 1 to as high as 11 per cent the average being about 6 per cent. He calls on the health authorities to take steps to deal with the problem.

H. Harold Scott

VOGEL (Hans). Ueber Entwicklung, Lebensdauer und Tod der Eier von *Bilharzia japonica* im Wirtsgewebe [On the Development, Length of Life and Death of the Eggs of *Bilharzia japonica* in the Tissues of the Host].—*Deut. Trop. Ztschr.* 1942 Feb 1 & 15 Vol 46 Nos 3 & 4 pp. 57-69 81-91 With 5 figs. [10 refs.]

In the first part of this paper Vogel describes eight types of eggs of *S. japonicum* seen in crush preparations of fresh tissues of the intestinal wall of mice, rabbits, guinea-pigs, dogs and monkeys artificially infested with this parasite. The wall of the mouse's intestine is especially suitable for this work because it is very thin. From the intestinal walls of the larger animals the mucosa and submucosa were scraped off with the edge of a slide and thin layers of the mush so obtained were examined. Attention was concentrated on the main developmental features, the time required for the development of the miracidium and the changes in the egg after its death in the host's tissues. Good illustrations are given of the following eight types of eggs seen—

1. The new laid egg which is quite different from the eggs in the uterus—in the latter the yolk cells are relatively small and compact and do not fill the egg space—in the former a vacuole 14-23 microns in diameter appears in each yolk cell, expanding it so that the yolk cells fill the egg space. Yolk granules lie on the edges of these vacuoles and between them. The crowding of the egg with vacuoles renders it less transparent. Stained preparations show that the egg nucleus has divided into two nuclei rather unequal in size. These "mulberry" stages of the egg also appear in liver tissue. New-laid eggs are found in the lumina of the smaller vessels usually in chains. They measure 67×46 microns (the uterine egg measures 65×50 microns). The mulberry stage lasts only about one day.

2 Eggs with an immature embryo.—This stage includes most of the development and lasts much longer than stage 1. Four stages in development can be made out. (a) The vacuoles of the mulberry stage have gone and the yolk granules are uniformly distributed in the yolk cells among which is the transparent embryo composed of a few cells. These eggs measure 65×43 microns. (b) Rather smaller eggs measuring 63×41 microns containing a rounded transparent embryo occupying almost the whole of the egg and contrasting with the dark yolk granules most of which have disappeared. (c) Rather bigger eggs containing oval transparent embryos which almost fill the eggs rudiments of the organs are still not visible in fresh preparations. (d) Eggs measuring 77×57 microns containing miracidia almost mature. The tapering anterior end is now seen for the first time. Cilia can also be seen with difficulty and the head glands intestine ganglion and terminal cells of the excretory system are more or less visible.

3 Eggs with mature miracidia.—The maximum size of 84×65 microns has been reached. The regular oval of the embryo has given place to an irregularly indented body with a pointed anterior end. Its cilia, head glands intestine nervous system and excretory canals are well seen and it shows jerky movements.

4 Eggs with disturbed development.—These are the same size as those of stage 3 and are rare. They show a small embryo in a disproportionately large egg space. The yolk collects at the egg poles the embryos are dead and may show signs of degeneration. In rabbits mice dogs and monkeys such eggs amount to 1–2 per cent or less of all the tissue eggs but in guineapigs and hamsters they are much more numerous. Vogel reminds us that development is not completed in the hamster so that the relatively large number of these eggs is easily understood.

5 Eggs containing miracidia that have recently died.—At first only slight changes occur in such miracidia. The larval area is only slightly turbid but the surest sign of death is the cessation of ciliary action. Later irregular clumps of cells are seen, which break up into granules. Nishi described this stage as granular degeneration. The larva may now acquire a brownish tint.

6 Calcified eggs measuring 70×51 microns calcification having led to some shrinkage.—Such eggs are strongly refractile in fresh preparations if the calcification centre is homogeneous they are colourless or yellowish if it is folded they look dark or almost black. They stain intense black with silver nitrate. The calcareous matter can be expelled by pressure with radial splitting of the egg shell.

7 Granular eggs measuring 68×52 microns full of fine or coarse strongly refractile fatty granules soluble in xylol and staining with Sudan III.—The shell may be deformed. These were formerly described by some Japanese workers as new laid eggs. Vogel thinks they are unfertilized or have for other reasons failed to develop.

8 Empty shells or shells filled by host cells.—The shell is usually irregularly folded or split open.

Counts on the eggs in the intestinal tissues of rabbits with infestations about 2–3 months old showed that eggs with immature embryos were most numerous and that most of the dead eggs were of the granular type. The percentage of calcified eggs was small probably because the infestation had not lasted long enough in other rabbits killed 7 months after infestation 60.5 per cent of the eggs were calcified.

Counts of the eggs in the liver were made difficult by the density of the liver tissue. Thin razor sections of this were better than frozen sections. More calcified eggs were found in the liver probably because there is no natural outlet from this organ (see length of life of miracidia below).

To determine the time needed for the development of the miracidia Vogel infected white mice and killed them at intervals during the succeeding 18-37 days. He concludes that eggs passed on the 25th day after infestation and most of those passed on the 26th day are not fertilized. The possibility of fertilization was determined by examining the worms for sperms in the male and for sperms and eggs in the uteri of the female. The first fertilized eggs were passed on the 26th and 27th days after infestation. The first mature miracidia appeared on the 36th day being very rare then, so that the miracidia needed 9-10 days for their development. This was confirmed by experiments described in the second part of Vogel's article on mice treated with tartar emetic.

In the second part Vogel discusses his work on the length of life of the eggs in the tissues. Large numbers of eggs die a natural death or are killed by the host's reactions. Vogel and Blumling treated rabbits infested with *S. japonicum* with intravenous tartar emetic and found new-laid egg still in the intestinal wall seven days after the beginning of treatment but none on the ninth day and afterwards. The treatment had thus stopped egg laying on the seventh, eighth and ninth days. On the 16th day after treatment began, eggs with immature embryos could still be found, but from the 19th day onwards none could be found. This meant that the miracidia of the last eggs to be laid (those laid on the seventh or eighth days) were mature on the 17th, 18th and 19th days so that 9-12 days were needed for the development of the miracidia, a time which corresponds with that determined by the observations on the eggs in fresh tissues described in Vogel's first article.

Eggs with mature miracidia were seen for the last time in the gut tissues on the 29th day after treatment began. On this day in two other rabbits and in other animals such eggs could not be found. The maximum life of the eggs was thus 21-22 days from laying to death. Was this normal or due to the action of the antimony?

To answer this question Vogel used the fact that the right lobe of the rabbit's liver has a separate branch of the portal vein. If this is ligatured there is no other communication between the portal system of the right lobe and that of the rest of the liver. Ligature makes it possible to stop the entry of schistosome eggs from a certain time onwards, so that the length of life of eggs admitted to this lobe can be estimated. The operation for ligature of the branch of the portal vein to the right lobe while leaving intact the artery and bile ducts of this lobe is described. If this is done there is no risk of disturbing the nutrition of the eggs because nothing more happens than atrophy of the liver parenchyma. Seven rabbits were each given 200-250 cercariae of *S. japonicum* and the success of the infestation was determined by faecal examination. The portal vein to the right lobe of the liver was ligatured 87-180 days after infestation and the livers were sectioned at 7, 16 and 20-23 days after ligature. No worms or cercariae were recovered from the right lobe of the liver although they were obtained from the gut and rest of the liver. At seven days after ligature the right lobe showed none of the youngest egg stages described above: no new laid eggs and no eggs with immature embryos, but numerous eggs

at stages 2c and 2d and eggs with mature miracidia. At 16 days after ligature there were only eggs with living mature miracidia at 20 days these were rare but degeneration was beginning in the miracidia of most of them, although cilia could still be seen. At 21 days only dead eggs were found but two miracidia were recovered. At 22 and 23 days there were no living eggs and no miracidia could be recovered. The maximum life of the eggs was therefore 21 days [cf the 21-22 days determined by the work with rabbits treated with antimony]. The development of the egg takes 9-10 days so that the mature miracidia live only the strikingly short time of 11-12 days. During this time the eggs must get into the gut lumen so that it is possible that only eggs that lie near the inner surface of the gut lumen get into it.

G Lapage

BERGE (Ch) AUDOYÉ (H) FAUCONNIER (J) & BERGE (L) Un cas tunisien d'infestation par la grande douve du foie (*Fasciola hepatica*) [A Tunisian Case of Infestation by the Large Liver Fluke (*Fasciola hepatica*)]—*Arch. Inst. Pasteur de Tunis* 1940 Dec Vol. 29 No 4 pp 466-470

The authors describe the first published case of infestation of the liver of man in Tunis. Only 130 cases are known in the world and only eight cases in Algeria. They think it may not be exceptional in Tunis because the parasite is so common in sheep and oxen there and is acquired by eating watercress and other uncooked food contaminated by the cercariae. Diagnosis depends on finding the eggs of the parasite because the clinical picture is vague and not characteristic.

Their patient was an army cook aged 26 with a history of periodical epigastric painful crises without vomiting sometimes lasting several hours. He had been in hospital earlier in the year with a diagnosis of cholecystitis and then had passed a Taenia. The previous year he had had malaria (*P. vivax*) and had been treated with quinine and sodium cacodylate. In the same year his condition had been diagnosed as dysentery with glairy stools containing blood, but no amoebae. Amoebic cysts or parasitic eggs had been found. When admitted he said he had often eaten watercress bought in the Bizerta market. He had lost 7 kgm in six months. Examination revealed little except a slightly enlarged liver with a palpable lower border, pain on palpation over the solar plexus, a palpable spleen and an eosinophilia of 20-34 per cent. There was no anaemia, icterus or fever and no parasitic eggs were found in the faeces. Duodenal intubation however revealed eggs of *Fasciola hepatica* in the bile. Treatment with emetine injections and 914 by the method of Ravaut failed to remove the flukes, their eggs being even more numerous when duodenal intubation was repeated at the end of the treatment (after about two months). The patient had then to be sent to another hospital for military reasons. The eosinophilia varied from 66-50 per cent when he was discharged.

The authors single out as the dominant signs the eosinophilia accompanied by colic without fever and the loss of weight without anaemia. They think the prognosis is grave. Cachexia and death may follow. Duodenal intubation may reveal other cases in Tunis, and the consumption of watercress of unknown origin is not wise.

G Lapage

MAZZOTTI (Luis) & OSORIO (M. Teresa) Sobre la presencia de huevecillos de *Fasciola hepatica* en los extractos biliares medicinales. Su significación en el diagnóstico coprológico [Eggs of *F. hepatica* in Medicinal Ox Bile.]—Rev. Inst. Salubridad y Enfermedades Trop. Mexico. 1941 Dec. Vol. 2. No. 3-4 pp. 355-381 With 1 fig. English summary

"It has been stated that persons having ingested liver or biliary extracts derived from parasitized animals may show *Fasciola hepatica* eggs in their stools

As this source of error appears to have occurred exceptionally in Mexico an examination was made of 30 samples of ox gall extract from different drug-stores of the city of Mexico. In 10 of the samples *F. hepatica* eggs were present

"Information was obtained that the samples of extract which presented eggs had been obtained by the drug stores from European North American and Mexican laboratories. The number of eggs present in the extracts appeared to be low

Several patients were experimentally given ox gall extract in various doses but it was possible to find several eggs in the excreta of them only when an extract partially made with ox gall from very parasitized cattle was used

SALDIN DE R. ORIGUEZ (M. L.), SOTO (J. A.) & GIAMPIETRO (J.) Cisticercosis cerebral y muscular [Cerebral and Muscular Cysticercosis]—Archivos de Pediatría y Urología 1941 Sept. Vol. 12. No. 9 pp. 549-567 With 3 figs. [20 refs.]

The authors discuss the geographical distribution of cysticercosis, its age-incidence, aetiology, pathology, symptoms, clinical manifestation, differential diagnosis by modern methods, prognosis and treatment and the life cycle of *Taenia solium* and the structure of its various stages in the tissues. Remarking that it is a disease of adults and that they have found in the literature the record of only one case in a child, the historic case recorded by AUSTONI they describe one case of their own, in a Spanish child aged 14 who belonged to a family which had the care of pigs and ate large quantities of cooked and uncooked pig meat. An uncle had a *Taenia* and the girl herself had various unspecified intestinal parasites. At the age of 11½ she had attacks of an epileptic type at first incomplete and of short duration and later more intense with every character of epilepsy. Clinical and laboratory examinations failed to show any abnormality, but radiography of the head showed numerous calcified nodules inside the brain which were diagnosed as calcified cysticerci. Radiography also revealed similar nodules in the upper third of the legs. The family and the patient objected to biopsy so that this could not be done. Treatment with arsenicals gave no result.

Human cysticercosis is almost unknown in Uruguay only two cases being known in adults, one having been diagnosed at autopsy and the other by radiography. Their case is the first to be described in a child in Uruguay, no other have been found in South American literature. In European literature they have found only the case described by AUSTONI in a girl aged 10 in whom biopsy revealed cysticerci. This patient died and autopsy confirmed the diagnosis and *Taenia solium* was found in the intestine. She had had headaches for 10 years with

vomiting muscular pains and a cerebellar syndrome. In the authors case the epileptic syndrome was the only manifestation and diagnosis was possible only by radiography radiograms are given of the head and legs. *G Lapage*

BRILLSFORD (James F) Unrecognized Cysticercosis — *Lancet* 1942.
• Jan. 24 pp 127-128

The author's distinctive views are set out in his summary. Radiography permits of the diagnosis of cysticercosis when the parasites have degenerated and calcified but affords no help in the earlier years of infestation. Writers in recent years have focused undue attention on the effects of the dead parasite even to the point of advising against any treatment likely to kill it. Actually it is rare to obtain radiographic evidence of cysticerci in the brain in patients with symptoms of central nervous disease. The more important symptoms occur at the time of infestation and during the development of the parasite and these are misinterpreted. In later years when symptoms have as a rule ceased radiography for other reasons may reveal the calcified parasites. Attention to the early diagnosis and treatment offers a hopeful outlook. By simple preventive measures the disease could be eradicated.

GRANA (Alfonso) & SCHENONE (Br Héctor) Eosinofilia del liquido cefalo-raquídeo por cisticercosis cerebral [Eosinophilia of the Cerebro-Spinal Fluid due to Cerebral Cysticercosis] — *Arch Urn guayos de Med Cirug y Especialidades* 1941 Aug Vol 19 No 2. pp 135-145 With 4 figs. on 2 plates. [19 refs]

The authors review the literature on cysticercosis in man and discuss the diagnosis. They record details of one case a boy 18 years old with a history of headaches photophobia and fever. Three features of the cerebrospinal fluid are emphasized (1) it was not clear (2) it showed a high eosinophilia of 32 per cent. Eosinophilia of the cerebrospinal fluid has been recorded by Denme by Merrito and Freeman and by Russo who regards it as pathognomonic of cerebral cysticercosis. In the authors case the eosinophilia decreased until at the last examination a month after the beginning of the illness it had reached 10 per cent when the patient was apparently returning to health. On the other hand Dolgopol states that the fall of the eosinophilia of the cerebrospinal fluid is accompanied by an aggravation of the illness (3) it contained an excess of glucose although the blood sugar was normal. The possible significance of this is discussed.

Examination of the eye revealed the presence of a protruding body in the left retina which was not diagnosed by eye specialists. Radiography failed to reveal calcified cysticerci in the muscles. Casoni's intradermal reaction was negative but Talice's intrafermal reaction with cysticercal fluid was so positive that the diagnosis was certain. Irregularities in the large third ventricle which is the site of election of cysticerci and a similar irregularity in the right occipital horn resembled localized cysticerci.

The authors emphasize the fact that the red blood cell count was 7 million. They think this was due to the localization of the cysticerci in the region of the hypothalamus. They compare this fact and the leucocytosis fever and somnolence shown by their patient with similar symptoms recorded by Laruelle in a case of cystic tumour of the third ventricle.

G Lapage

GAUFF (H.). Die Gehirnhirnhernien. [Cerebral Cysticercosis.]—*Dtsch. Med. Woch.* 1941 Nov 21 Vol. 67 No. 47 pp 1268-1282. With 3 figs. & 4 charts.

FERRACANI (Remo S). Obstrucción intestinal por ovillo de *Taenia saginata*. Intestinal Obstruction by *Taenia saginata*.—*Rev. Med. Quirúrg. y Pat. Ferrocarril.* Buenos Aires. 1941 Oct. Vol. 18 No 4 pp 317-319 With 1 fig.

A woman of 62 years who was known to be harbouring a *Taenia saginata* had suffered a year previously from obstruction which, however, passed on spontaneously. On the present occasion she felt one morning a dull pain in the right hypochondrium after breakfast this became more acute and was accompanied by vomiting which later became bilious then faeculent, in fact the signs of acute obstruction were evident. At operation a bunched up mass of a *T. saginata* was found in the small intestine 32 inches above the ileo-caecal valve. Its removal resulted in cure and convalescence was uneventful.

H Harold Scott

AGUILAR (Francisco J). Parásitos que existen en Guatemala. La *Tenia Equinococo* en estado larvario infesta en considerable proporción al cerdo. Es muy probable que existan casos humanos. Parasitism in Guatemala. Echinococcus Infestation of Pigs.—*Guatemala Med.* 1941 Nov Vol. 8 No 11 pp 4-5 With 2 figs.

The author has found hydatid infestation in a considerable proportion of pigs slaughtered. Among 190-431 killed in five years 4-033 showed the cysts, i.e. 2.1 per cent but the proportion varied from year to year in 1938 it was only 0.22, whereas in 1940 it was 1.38 and in 1936 as high as 6.12 per cent. Sheep and goats rarely harboured the cysts. The liver was the commonest site the kidneys next and, fewer in the spleen and mesentery. The author states that there are possibly human cases also. This is quite possible, but no facts are given in support of the suggestion and the heavy infection of the pigs is ascribed to this animal's voracious habits.

H Harold Scott.

SALGAR (Abraham Afanador). El primer caso de quiste hidático en Colombia. The First Case of Hydatid Cyst Reported in Colombia.—*Rev. Facul. de Med.* Bogotá. 1941 Oct. Vol. 10 No. 4 pp 325-338 With 12 figs. on 4 plates.

ARCE (José). Hidatidosis (Hydatidosis). Hydatid Cyst of the Lung. *Arch. Surg.* 1941 Nov Vol. 43 No. 5 pp 789-802 With 4 figs.

RIVAS (Carlos I. & GÓMEZ (Emilio). Equinococosis hidatídica del pulmón. El signo del doble arco de Ivanssonerich. [Hydatid Cyst of the Lung: Ivanssonerich's Sign.]—*Bolet. Inst. Cien. Quirúrg.* Buenos Aires. 1941 Oct-Dec. Vol. 17 No 143 pp 1230-1237 With 8 figs.

MOXIL (Clemente J. L.). Quistes hidatídicos del bazo. [Hydatid Cysts of the Spleen.]—*Bolet. Inst. Cien. Quirúrg.* Buenos Aires. 1941 Oct-Dec. Vol. 17 No. 143 pp 893-894. With 131 figs. [Echography.]

AGUIAR (José Adonias) Nephrose lipoidica ankylostomosa [Fatty Nephrosis due to Hookworm Infection]—*Brasil Medico* 1940 Mar 2 Vol 54 No 9 pp 129-135 With 2 figs [11 refs]

Aguiar discusses the aetiology of fatty nephrosis in cases of ankylostomiasis. BERARDINELLI thought that ankylostomiasis may cause fatty nephrosis a view which Aguiar thinks is supported only by clinical reasoning and lacks experimental proof. It would be proven if removal of the hookworms resulted in disappearance of the fatty nephrosis. He gives a detailed history of one case described in the classes of Professor TAVARES in 1939 in which this happened. The patient a man of 20 years had numerous eggs of *Ancylostoma duodenale* in the faeces and some eggs of *Ascaris lumbricoides* and *Trichuris trichiura*. Oil of chenopodium reduced the number of ancylostome eggs till 18 days after treatment they were very rare. Later the fatty nephrosis disappeared. The patient had malaria as well but this was not considered to be responsible for the clinical picture because malarial treatment before admission to hospital intensified the syndrome. The various questions arising out of Berardinelli's views are discussed.

G Lapage

VILLEGAS (N) Edema and Cachexia from Ascariidiasis.—*Bol Clínico Medellín*. 1941 Oct Vol 7 p 483 [Summary taken from *Jl Amer Med Assoc* 1942. June 13 Vol 119 No 7 p 597]

Villegas describes a type of cachexia in nonsyphilitic children with ascariidiasis which is characterized by excessive coldness of the extremities bleeding gums, pellagroid mucosal and buccal lesions dermatitis anasarca, vomiting diarrhea or constipation meteorism, loss of appetite hypotension muscular and psychic asthenia, somnolence and rapid progressive decline in the weight and in the general condition of the patient. It is observed in poorly nourished children of tropical and semitropical countries. Treatment with diuretics anthelmintics epinephrine vitamins tonics and hormone preparations usually fails. Mortality is 80 per cent. Good results were obtained from administration of eight drops daily of nux vomica for 10 to 15 days. The general condition improved from the first two or three days of the treatment during which the patients eliminated a large number of ascarids and regained their appetite. After three to five days of the treatment 13 Gm of castor oil with four drops of volatile oil of chenopodium is given. The diet consists of milk fruits meat vegetables and carbohydrates given as soon as the treatment starts. Permanent cure was obtained in all cases. Edema of the feet disappeared in the course of the treatment.

DHAYAGUDE (R. G.) & AMIN (B. M.) Microfilarial Granulomata of the Spleen.—*Amer Jl Path* 1942. Mar Vol 18 No 2 pp 351-361 With 8 figs on 2 plates.

Search through the records of the King Edward VII Hospital Bombay has revealed no mention of filarial lesions of the spleen in an area where filariasis is common. Yet these writers report on eleven spleens obtained at necropsy at this hospital they all showed lesions readily detected by the naked eye and these lesions contained microfilariae under the microscope.

Death was due to injuries in six of these cases—the spleen was clasped as normal in size in six, as smaller than usual in two—as enlarged in two, as little larger than normal in one. The time between admission to hospital and death lay between a few minutes and four days.

"In these spleens nodules could be felt at the surface. They were smooth and rose a little above the surface. They were a little firmer than the rest of the splenic tissue and their size varied from 2 to 25 mm. Usually they were multiple, but occasionally only a single nodule was present. On the cut surface the nodules presented a reddish or reddish brown appearance quite distinct from the chocolate colour of the splenic parenchyma. They were sharply circumscribed and occasionally two or three of them merged into one large nodule. In a preserved organ the nodules stood out on the cut surface."

They were thought to be endotheliomata, but some showed marked eosinophilia and closer investigation showed that each one contained microfilariae. A nodule is denser than the surrounding spleen and splits away from it on hardening and sectioning while before sectioning it may be seen projecting out from the surface of the hardened spleen. Histologically the nodules showed marked local or general eosinophilia and either dilated sinuses filled with red cells or pronounced hyperplasia of reticulo-endothelial cells. In some sections giant cells were conspicuous; in some reticular tissue was increased, usually without increase in fibrous connective tissue.

"The nodules did not contain any malpighian bodies or large-sized blood vessels. Apparently they derived their blood supply from capillaries and sinusoids. It may thus be seen that the histological structure of the lesions was that of a granuloma."

Every one of these lesions showed microfilariae [subsequently identified as *W. bancrofti*] in tissue sections, in very varying numbers and not associated with any particular histological change. In sections of other organs presence or absence of detected microfilariae was noted.

Clayton Lane

Ho (S. M. K.) Studies on the Susceptibility of Shanghai Mosquitoes to Experimental Infection with *Microfilaria malays* Brug. V. *Armigeres obsoletus* Walker—*Peking Nat. Hist. Bull.* 1941 Vol. 16 Pt. 1 pp 55-65 With 2 plates. VI. *Aedes albopictus* Skuse.—*Ibid* pp 67-70 With 1 plate. Summary taken from *Rev. Applied Entom.* Ser. B. 1942. June. Vol. 30 Pt. 8. pp. 84-85

These two papers contain records of experiments, similar to others already noticed, that were carried out during 1939 and 1940 in Shanghai to test the susceptibility to infection with *Filaria (Microfilaria) malays* of *Armigeres obsoletus* Wlk., and *Aedes albopictus*, Skuse respectively. Of 140 adults of *Armigeres obsoletus* that had engorged on patients with light infections, only one, dissected 13 days after the feed, harboured an infective larva, 118 were negative and 21 contained dead immature larvae. Out of 25 adults of *Anopheles hyrcanus* var. *sincensis* Wied., fed at the same time as some of the 140, 17 contained infective larvae on dissection. All the 149 adults of *Armigeres obsoletus* fed on a patient with a heavy infection contained immature larvae at the time of dissection, and 11 contained infective larvae also, those in three of them being alive. Most of the immature larvae had died in the first stage and had undergone chitinous encapsulation. The greatest number of

living infective larvae found in one mosquito was 6 and the greatest total number of larvae in one mosquito was 97. When a female of *A. obturbans* and one of *Anopheles hyrcanus* var. *sinensis* were fed at the same time on a heavily infected patient and dissected 28 and 20 days later respectively the former was found to be harbouring two encapsulated dead ensheathed microfilariae in its abdomen and 19 dead encapsulated first-stage larvae in its thorax of which 11 were in the sausage form and two had started to elongate towards the first ecdysis while the latter contained 38 infective larvae. Although the susceptibility of *Armigeres obturbans* to infection is thus shown to be low it is possible that as it is one of the most common household mosquitoes in the lower Yangtze region where it breeds in heavily polluted water it may play a minor part in the transmission of infection. It comprised 1,250 out of 11,740 mosquitoes collected in a man-baited trap during 1934 in a village in the Kaochiao district and 383 out of 1,216 taken in houses in the Woosung region in September and October 1933.

Of 180 individuals of *Aedes albopictus* fed on lightly infected patients two were found on dissection to contain single dead encapsulated immature larvae. The others were negative. Of 175 fed on a heavily infected patient 77 were negative while the remainder were harbouring dead first-stage larvae most of which were encapsulated microfilarial forms in the abdomen.

OELKERS (H. A.) & ZESSLER (H.) Untersuchungen an Oxyurenlarven [Research on Enterobius Larvae].—*Klin Woch* 1942 Mar 21 Vol 21 No 12. pp 269-270

Fresh Enterobius larvae remained alive *in vitro* for two or three days and showed very different sensibility to anthelmintics that have been tested against them. Usually their resistance is extraordinarily high.

For example, santonin in saturated solution is useless. Filmaron, ascaridol and pyrethrin may have no effect even when acting for long in high concentration. Certain thymol derivatives and ethereal oils have proved relatively lethal.

The effects of pepsin and trypsin in solutions of different pH values on the hatching of eggs are described. Clayton Lane

SCHWARTZ (J.) & STRAUB (M.) Oxyuriasis and Appendicitis.—*Arch Pathology* 1942 Jan. Vol. 33 No 1 pp 28-36 With 3 figs. [20 refs.]

DEFICIENCY DISEASES

FRONTALI (G.) Neue Studien ueber Pellagra [New Studies in Pellagra].—*Schweiz Med Woch* 1942 Feb 21 Vol 72. No 8 pp 208-217 With 15 figs. & 1 chart

This is a long involved communication which does not readily lend itself to analysis. The author writes from Padua. The results may be stated as follows:—

(1) A pellagra-inducing diet can be transformed into a pellagra healing diet by addition of nicotinic acid or its amide.

epidemic dropsy [see this Bulletin 1939 Vol. 36 p 810 1941 Vol 38 p 288] By the nitric acid test of Lewkowsitch and Warburton a sample of oil which caused epidemic dropsy was found to contain 4 per cent. Argemone oil. The author states, however, that the test is not specific and may be given by many substances other than Argemone oil, and he proposes another which he claims is better specific and more sensitive detecting the oil in as small a proportion as 0.75 per cent. though the test is a qualitative one only. Its principle is that Argemone oil when heated with ferric chloride solution in presence of strong hydrochloric acid and ethyl alcohol has been found to give an orange-red precipitate. If the conditions are favourable this precipitate may be obtained as a mass of beautiful orange-red fibrous crystals deposited at the bottom of the test tube or floating in the lower acid layer. They may also be seen collected at the acid-oil interface. Full details for carrying out this test are given below.

Experimental

- Reagents
- 1 Concentrated hydrochloric acid
 - 2 Ethyl alcohol Rectified spirit preferable
 - 3 Ferric Chloride solution prepared by dissolving 10 g of crystallised ferric chloride ($\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$) in 10 cc. of concentrated hydrochloric acid and 80 cc. of water

Procedure

"Two cc. of the oil to be tested is taken in a test tube, 2 cc. of concentrated hydrochloric acid is then added, the contents mixed thoroughly and then heated in the water bath kept at 55-65° for 2 minutes. Then 0.8 cc. of ethyl alcohol is added, the mixture shaken thoroughly and kept in the water-bath for 1 minute. Two cc. of ferric chloride solution is then added the contents mixed thoroughly by shaking and the whole thing afterwards heated in the water-bath for 10 minutes.

The importance of this is that (if it is specific) three samples of mustard oil which had been incriminated as setting up the disease are shown not to contain argemone oil, at all events not in a proportion of 0.75 per cent or higher although previous workers had come to the conclusion that 4 or even 6 per cent was necessary to cause the symptoms.

H Harold Scott

SARKAR (S N) A Note on the Preparation of Mustard Oil Resembling the Epidemiologically Incriminated Sample in Physical and Chemical Properties.—Ann Biochem & Exper Med Calcutta. 1941 Vol 1 No 4 pp 323-326

Ghani cakes prepared from Argemone-free mustard seeds, if kept in a damp place developed a surface growth of *Monilia* sp. These cakes are purchased cheaply and re-extracted to give about 6 per cent. mustard oil. Samples of suspected oil contain spores, which may be spores of this fungus. The fungus develops in stored mustard seed during the rain. Argemone-free mustard seeds were monitored and the mass inoculated with pieces of the infected cakes, and soon the fungal growth was observed. The seeds were then expressed and the samples of mustard oil obtained gave the nitric acid test of Lal and his co-workers. Therefore if the nitric acid test is a criterion of toxicity these products of fungus-contaminated seeds, without any admixture of Argemone oil, may be the causal agent of epidemic dropsy. More work is to be done.

H Harold Scott.

LAL (R. B.) & DAS GUPTA (A. C.) Investigations into the Epidemiology of Epidemic Dropsy Part XV Incidence by Season.—*Indian J Med Res* 1942. Jan. Vol. 30 No 1 pp 145-154 With 4 graphs [29 refs]

It is a matter of common observation in Bengal that outbreaks of epidemic dropsy occur during and immediately after the rains but reports show that they may occur during the winter and spring some of them fairly extensive but generally not so large as the summer outbreaks. The authors quote the literature to demonstrate both these facts. CHOPRA and BHATTACHARJEE charted an ascent in July reaching an acme in August and then falling sharply but not touching the abscissa till April.

In a graph the number of cases (144) admitted to the Carmichael Hospital in the period January 1934 to 1940 are charted this differs from that of Chopra and Bhattacharjee in that the ascent begins in June and the peak is reached in July and the decline is more rapid, but never touching the abscissa and February shows a second small peak.

The authors apply these facts to the Argemone theory of the causation. The mustard crop is gathered in March *Argemone mexicana* ripens in March or a little later new mustard seed is on the market in April. During May and June the crushing is done and the new oil distributed presuming the Argemone is toxic and is taken then the three weeks incubation period of the disease would lead to the rise in July. The fall subsequently may then be due either to less contamination by the Argemone or to the loss of toxicity due to exposure to light and air in the retail shops. The reason of the secondary spring rise is yet to seek.

H Harold Scott

SPRUE

HURST (Arthur) The Pathogenesis of the Sprue Syndrome—*Guy's Hosp Rep* 1942. Vol. 91 (Vol. 21 4th Ser) No 1 pp 1-21 With 10 figs. [24 refs.]

Three constant characteristic features common to sprue non-tropical sprue and coeliac disease require explanation—

(1) Stools contain excess of split fat but no excess of neutral fat meat fibres or starch.

(2) The normal feathery or herring-bone aspect of the duodenum and jejunum produced by the valvulae conniventes on X ray examination is absent.

(3) No pathological changes are found in the intestines after death provided post-mortem decomposition has been prevented.

Hurst claims that adequate treatment results in restoration of normal fat absorption and in reappearance of the normal radiographic aspects of the small intestine.

No adequate hypothesis has so far been put forward to explain these characteristics but it is suggested that a satisfactory explanation can be founded upon a proper understanding of the modern physiology of fat absorption (based upon VERZAR & McDOUGALL's *Absorption from the Intestine* 1936).

The absorptive surface is greatly increased by the valvulae conniventes in the duodenum and jejunum, which give rise to the feathery or herring-bone appearances when visualized by X-rays after an opaque meal.

The villi number from 20-40 per sq. mm. and fat absorption is effected by rhythmical contractions of the villi (about six per minute). This in turn is brought about by stimulation of Meissner's plexus which innervates the muscularis mucosae.

The stimulus is provided by a hormone villikinin, secreted (like secretin) by the duodenum and found in acid extract. Local application of crude yeast or histamine may also give rise to contractions. The synthesis of fat in the epithelial cells is a complicated process and is inhibited by a proteolysin.

The constant abnormality in the stools of sprue non-tropical sprue and coeliac disease is the presence of excess of split fat in the form of shavings of colourless needle-shaped crystals of fatty acids and soaps and absence of some of neutral fats. These features can be recognized by microscopic examination of the stools.

The excretion of gas in large and small intestines is not dependent on excess of undigested starch, but is probably the result of deficient absorption as it is in vascular congestion of chronic hepatic, cardiac and vascular disorders).

The term "jejuno-ileal insufficiency" does not emphasize the specific nature of the insufficiency i.e. the inability of the small intestine to absorb fat. This however may also be present in intestinal carbohydrate dyspepsia, which is quite independent of the "sprue syndrome." "Sprue syndrome" is the best designation to include the group of disorders, in which hypocalcaemia, tetany, decalcification of bones, hypochromic or hyperchromic anaemia, stomatitis and glossitis are features.

In addition there is distension of small and large intestine with gas and vitamin deficiencies are also present.

The hypocalcaemia is held to be the result of excessive calcium excretion in the stool, resulting from its combination with unabsorbed fatty acid. Moreover any deficiency in fat soluble vitamins must also be a direct result of deficient fat absorption.

The flattening of the glucose tolerance curve is not probably the result of delayed absorption, but of disturbed carbohydrate metabolism. As regards the morbid anatomy the constant changes such as round-celled infiltration and occasional isolated ulceration may be the result of secondary infection or are probably attributable to prolonged irritation by new fatty acids. Especially important is the irritation by excess of soap which can be produced artificially in normal individuals by a soap and water enema.

Whenever all precautions are taken against post mortem decomposition, as in Thayer's case of tropical and non-tropical sprue no macroscopic or microscopic changes are found in the mucosa or submucosa of the intestines. Similarly no changes have been found in the limited number of autopsies on coeliac disease.

As an explanation of the mechanism of the sprue syndrome it is suggested that paralysis of the muscularis mucosae would result in flattening or disappearance of the valvulae conniventes, which in turn would reproduce the characteristic radiographic appearances of duodenum and jejunum in tropical sprue non-tropical sprue and coeliac disease.

Paralysis of the extension of the muscularis mucosae into the villi would result in cessation of the pumping action consequently fat would cease to be absorbed but the activity of the pancreas would remain unaffected

The stools would consequently have an excess of split fat but no excess of neutral fat as in sprue and coeliac disease. In such a paralysis the microscopic appearance of the mucous membrane would remain unaltered

The origin of this suggested functional failure might be due to various causes including the absence of the constituent of the chyme which is the chemical stimulant of Meissner's plexus or the result of vitamin deficiency possibly vitamin B₁₂ since it has been shown that this vitamin in tropical sprue exerts a more favourable action than any other treatment

There is no question that the abnormal radiographic appearances are due to presence of excess of undigested fat as they are present in the duodenum where fat digestion has hardly begun and they are not present in those cases of the sprue syndrome associated with disease of the mesenteric glands and obstructions of the lacteals where hindrance to fat absorption occurs at the level of these glands instead of in the villi.

[See also LEITNER, this *Bulletin* 1942 Vol. 39 p 497]

P Manson Bahr

RODRIGUEZ OLLEROS (A) Analogías y diferencias gastrologicas entre el espru tropical y la anemia perniciosa [Similarities and Differences in Gastric Conditions between Sprue and Pernicious Anaemia] —*Boletín Asoc Med de Puerto Rico* 1942, Apr Vol 34 No 4 pp 128-133 [29 refs.]

Achlorhydria even after histamine is acknowledged to be a usual feature of pernicious anaemia whereas it is observed in some 30 per cent only of cases of tropical sprue. The author discusses this with other points to demonstrate gastrological analogies and differences between the two conditions. In this article he deals with (1) Bacteriology of the gastric contents (2) The appearances seen by gastroscopy and (3) The excretion of neutral red by the gastric mucosa which he designates chromoscopy

Under the first whereas in normal conditions the low pH of the gastric juice prohibits bacterial growth and the contents are sterile in sprue and in pernicious anaemia growth of Gram negative organisms is common and in the former Gram positive also. Thus in 25 cases of sprue both were found in 14 Gram negative only in eight Gram positive in one and two were sterile. Only two showed histamine-resistant achlorhydria.

As for gastroscopy there is some degree of atrophic gastritis but whereas in pernicious anaemia it may be generalized but more marked in one area than in another in sprue it is hardly ever so intense as in pernicious anaemia and rarely if ever generalized. Also since a much smaller proportion of sprue cases had achlorhydria, in this disease the atrophic condition was not accompanied by loss of function as it is with pernicious anaemia

The author maintains that in gastric atrophy the spontaneous secretion of free HCl is the first to go then its secretion though histamine

is given next secretion of total chlorides, and lastly the power of excreting neutral red. The test for this last is carried out as follows —

A fractional test of the gastric secretion is made after the patient had fasted for 12 hours, by giving him 0.2 gm. caffeine in 300 cc. water coloured with two drops of a solution of methylene blue. When this has left the stomach, 5 cc. of 1 per cent neutral red are injected into the buttock (if there are indications that there is no spontaneous secretion of free HCl, histamine is injected subcutaneously at the same time). Thereafter the gastric contents are extracted every five minutes till a red coloration indicated that the stomach had begun to excrete the dye.

In cases of pernicious anaemia this faculty is lost, states the author but in sprue though it may be delayed in action it is never lost. In normal persons in the tropics the excretion began in 14.7 minutes in those with normal acidity in 16.6 minutes in those with hyperacidity and in 24 minutes in those with hypoacidity (in a table this is called hyperacidity—an obvious mistake). In three suffering from tropical sprue, the corresponding times were 12.4, 13.7, 14.4 minutes, and in those with anacidity 24.2 minutes. The author maintains, therefore, that this neutral red test may usefully serve to distinguish the anaemia of sprue from true pernicious anaemia. *H. Harold Scott.*

HAEMATOLOGY

DIGGS (L. W.) & PETTIT (V. D.) A Comparison of Methods used in the Detection of the Sickle-Cell Trait.—*Jl Lab & Clin Med* 1940 Vol. 25 pp. 1106-1111 With 4 figs

From a comparative study of different methods the authors conclude that the most reliable and the most practical means for detection of the sickle cell trait which has yet been devised, is the moist stamp method of SCRIVER and WAUGH [this *Bulletin* 1931 Vol. 23 p. 845].

In this method stamp is produced by means of a rubber band placed about the proximal portion of the finger for five minutes. With the band still in place the end of the finger is then pricked and a fresh drop of blood is sealed on a slide under a cover slip and examined microscopically. The drop should be sealed as quickly as possible, as exposure to the air favours reversion of the distorted cells to normal shape. *F. Murgatroyd.*

VANCE (B. M.) & FISHER (R. C.) Sickle Cell Disease. Two Cases, one presenting Fat Embolism as a Fatal Complication.—*Arch Pathology* 1941 Sept Vol. 32 No. 3 pp. 378-386 With 2 figs. [17 refs.]

The abnormal spherular cells of sickle cell disease are destroyed by the body defences and the destruction is sometimes sufficiently extensive to be the cause of severe haemolytic anaemia. The difficulty presented to the passage of the abnormally shaped cells through the capillaries may also produce stagnation, thrombosis and endarteritis in the finer vessels with consequent necrotic and ultimately fibrotic changes in tissues supplied by such affected vessels. Clinical signs include abdominal pain, nausea, vomiting, migratory pains in the

joints signs of cardiac distress, and persistent non varicose ulcers may appear on the legs. Haemolytic cases may be icteric and death may occur early either from severe anaemia or from some intercurrent infection.

A fatal case of haemolytic anaemia is described and is particularly unusual in that it occurred in a boy of Greek parentage. The majority of cases of sickle cell disease reported in the United States are in negroes and it is estimated that 7.5 per cent of that race exhibit the condition but there are insufficient data to judge accurately the frequency of the occurrence and the extent of the disease throughout the world.

Pathologically, the early changes are due to congestion of the organs and lysis of the abnormal cells by the reticulo-endothelial system. The spleen is chiefly affected and is large and dark purplish red with a thin capsule and smooth surface. Perivascular haemorrhages from the terminal portions of the splenic arterioles and dilation of the capillaries of the malpighian bodies occur with the formation of small pools of blood. In more chronic cases organization of these haemorrhagic extravasations occurs which together with the vascular changes and infarcts lead to the destruction of the normal tissue so that the organ may shrink to an atrophic nodular mass weighing only a few grammes. Changes of a similar pathological type may occur in other organs including the bone marrow. At first the marrow is cellular and congested, with haemorrhages between islands of regenerating cells nucleated sickled cells have been described. Later thromboses, necrosis and sclerotic changes occur. Fat embolism may follow focal necrosis of the marrow and such a fatal case is described.

The patient a negro woman had severe pain low in the back for which she took an unknown quantity of aspirin and barbiturates. She became comatose and was admitted to hospital, where she died on the second day. At autopsy sickle cell disease with splenic atrophy was found. There were necrosis and haemorrhages of the marrow with pulmonary fat embolism and fat emboli in the kidneys, cerebral cortex and myocardium.

F Murgatroyd

CONNELL (John H.) Cerebral Necrosis in Sickle Cell Disease.—*Jl Amer Med Assoc* 1942 Mar 14 Vol. 118 No 11 pp 893-895 With 2 figs.

Various clinical manifestations associated with sickle cell anaemia have been recognized but systemic complications are probably much commoner than is usually realized and only a few cases with involvement of the central nervous system have been recorded.

The case described is that of a negro woman aged 20 admitted to hospital with a temperature of 100°F a pulse rate of 68 per minute drowsiness, vomiting headache and right-sided deafness. She also had a residual weakness of the left arm and leg dating from an illness six years before. Three days after admission she suddenly became comatose the temperature rose to 104.6°F and the pulse rate to 150 per minute the left pupil was then larger than the right there was stiffness of the neck all reflexes were diminished or absent and the patient died 12 hours after the onset of the coma. At autopsy there was massive necrosis of the left cerebral hemisphere with a firm red clot in the left middle cerebral artery an old cystic pigmented lesion was found in the right cerebral hemisphere and another in the right

in other cases the interval was from seven hours to three days. As the result of treatment the oedema subsided from one to four days later the general symptoms of intoxication rapidly disappeared, and there was an improvement in the blood picture and in the composition of the urine. The duration of the disease in the treated cases was from one to five (average 2½) days, as compared with periods exceeding one month in untreated cases. The circular novocaine block is thought to render the nervous system insusceptible to the action of snake venom, and in view of the successful results obtained, the author recommends this treatment for all forms of snake-bite involving the nervous system.

C A Howe

[If this view is correct it would be interesting to see the effect of novocaine block in cases of bite by members of the family Colubridae — Ed.]

KIRBY SMITH (H T) Black Widow Spider Bites.—*Ann Surgery* 1942. Feb Vol 115 No 2 pp 249-257 [36 refs]

The author reports 24 cases with one death (in a man of 69) but points out that in 248 cases recorded in the literature no deaths occurred, though in another series reported by BOGEN in which information was collected from death certificates, newspaper reports and personal communications the fatality rate was 6.6 per cent.

In the present series 16 patients were bitten in outside privies, most of the bites were on the penis, scrotum or buttocks. The patients usually suffer great pain, which begins in the muscle groups nearest the bite and spreads to the abdomen. The abdominal muscles are board-like but there is movement with respiration. Temperature is normal and pulse and respiration may be somewhat increased. The average duration of pain is about 24 hours. The condition closely simulates an acute abdominal lesion, and in one case laparotomy was performed in a patient with a history of peptic ulcer who did not at first say that he had been bitten. No abnormality was found within the abdomen and he later remembered the bite. [See also this *Bulletin* 1936 Vol 33 p 401]

Latrodectus mactans is a common spider in the United States, but does not readily attack man. The amount of venom is small but it has been stated to be 15 times as toxic as that of the rattlesnake. In treatment morphia is only moderately useful. magnesium sulphate solution (10 per cent intravenously or 25 per cent intramuscularly) and calcium gluconate solution (10 cc of 10 per cent intravenously) are of some value. Serum treatment is being developed and the author details a case in which it was apparently very effective. C IV

MISCELLANEOUS

CORR (J F) Treatment of Heat Pyrexia by Lumbar Puncture.
[Memoranda.]—*Brit Med J* 1942. June 20 pp 761-762.

This is an interesting account of a case of heat hyperpyrexia one of five which occurred on board ship during very hot weather when the temperature between decks was commonly $115-120^{\circ}\text{F}$ and in the engine-room about 140°F . The patient's temperature rose in spite of sponging with iced water to 109°F and he was then placed into an improvised ice bath. He was unconscious. The fall of temperature was rapid and though the bath was ordered to be discontinued when the patient's temperature reached 101°F a slight delay resulted in a condition of collapse during which his temperature fell to 97°F . It was therefore necessary to apply hot bottles for a time and this was followed by convulsions as pronounced as those which occur in tetanus. These were controlled by ether anaesthesia and lumbar puncture performed at the same time showed that the cerebrospinal fluid was under tremendous pressure. About 2 oz of clear fluid was withdrawn in half an hour until the pressure was normal. One pint of water was injected into the rectum and retained.

The temperature rose again later but was controlled with the ice bath and thereafter the patient steadily recovered. In all the other patients there was muscle twitching and one became unconscious all recovered and were perfectly well as soon as a cooler climate was reached.

C F

KAMPNEIER (R. H) & LARSEN (R. M) Elephantiasis due to *Lymphopathia Venereum*. A Note as to its Significance and the Effect of the Sulfonamides—*Amer J Syph* 1942 May Vol. 26 No 3 pp 316-329 With 9 figs

Lymphogranuloma inguinale has long been recognized as a cause of elephantiasis and STANNUS attributed it to a retrograde thrombotic lymphangitis originating in the lymph glands. The value of sulfonamides in the treatment of L.I. is now established, but they do not appear to have been greatly used for the treatment of the elephantiasis which it may cause. The authors of the present paper report three cases of long standing in two of which this form of treatment was successful.

In the first the infection was of eight years duration with many fistulae rectal and vaginal stricture and a rubbery swelling of the right labium. The condition appears to have improved very considerably after three months treatment with sulphathiazole, and two years later all the fistulae were found to have healed. The condition then relapsed but cleared up again under one month's treatment with sulphathiazole.

In the second case the disease had existed for seven years and by then both labia had become so large as to interfere seriously with walking and sitting. Sexual intercourse had been impossible for five years and there was rectal stricture. Sulphanilamide at the rate of 2.6 gm. a day caused rapid improvement and was continued for three months. A year later the induration of the labia and surrounding skin was found to have completely subsided though there was still

some enlargement of the labia minora and the clitoris, and a rectal stricture sexual intercourse had been resumed about six months previously after a lapse of six years.

The third case was a man with an elephantiasoid condition of the penis and scrotum of nine years duration. He had had a urinary fistula for four years. Sulphanilamide treatment failed to relieve the condition.

The author discusses the cause and concludes that the enlargement etc. must have been due to active inflammatory rather than cicatricial changes in the two first cases. In the third case a biopsy not performed on the first two showed considerably more fibrosis than is usually seen in an active case a photomicrograph of which is shown for contrast. The authors think that the fact of the condition having passed to one of cicatrix (they describe the subcutaneous tissue as resembling a keloid) accounts for its failure to respond to sulphonamide treatment.

As a result of their experience they consider that in such cases thorough treatment with sulphonamides is indicated before operation is undertaken.

L. W. Harrison.

ROPKE (F.) Zur Ätiologie des Kröbberschen Krankheitsbildes.—
[The Aetiology of Kröber's Disease Syndrome.]—*Deut Trop Ztschr*
1942. Feb 1 Vol 46 No 3 pp 69-71

In 1933 and 1939 KRÖBER (this *Bulletin* 1940 Vol. 37 p 226) described a disease of male natives of the west shore of Lake Victoria Nyanza characterized by urethral discharge fistulae in the neighbourhood of the perineum and scrotum, great distortion of the urethra and an elephantiasoid condition of the parts. The condition begins with a purulent urethral discharge which becomes complicated by extensive perirethral abscesses and fistulation. In this respect it may not be very different from some sequelae of gonorrhoea but the distinctive feature is the tendency to the formation of nodules and tumours at the mouths of the fistulae. Röpke mentions that a similar condition has been described by JUXGA in Liberia. The author has seen only a few cases in the plains near to the Usambara highlands and does not know if the patients were really natives of those parts. He is chiefly interested here in the cause and discusses the various possibilities. He suggests that a special organism might be responsible such as a fungus like the ray fungus, perhaps introduced by the straws which natives use to cope with urethral structure but all investigations in this respect have had negative results. He rules out lymphogranuloma inguinale tuberculosis and balharna. In regard to the last, he says that balharna is common in those parts but this disease is rare, and that no ova have been found in these cases. He does not dismiss gonorrhoea as an original cause but thinks that other germs completed the mischief. He wonders if para-urethral canals, which seem to play an important part in the aetiology are more common in natives than in whites. The labyrinthine development of the fistulae and the tendency of the condition to spread are not like the fistulous condition resulting from simple gonococcal infection which is very common in those parts. He favours the idea that *Wuchereria bancrofti* which is fairly common there may prepare the way for the subsequent lymphatic obstruction responsible for the elephantiasoid condition. Finally

he says that the condition requires much more investigation and in particular it is necessary to discover its geographical distribution

L. W. Harrison

READ (Margaret) *Migrant Labour in Africa and its Effects on Tribal Life*—*Internat Labour Rev* 1942 June Vol 45 No 6 pp 605-631 With 1 map & 1 diagram [Refs. in footnotes]

The emigration of labour is related to the Africans' love of adventure and desire to travel and to the traditional method of agriculture by shifting cultivation its importance in Nyasaland is shown by the fact that the country's chief export for the past 50 years has been men. An estimate made in 1939 revealed that nearly a quarter of the total male adult population was abroad. The present survey covers 110 villages in six areas in the Northern Province of Nyasaland of 3 818 adult males 33 per cent. were away at the time of the survey and 49 per cent. had formerly been away. These conditions make for economic disequilibrium—urban areas grow richer rural areas grow poorer and the same Africans have a footing in both and the increasing maladjustment is only too obvious. No correlation was found between the numbers of absent males and the standard of diet and of housing. One reason given for the absence of effect of emigration on standard of food is that food rations are considered as wages and money is spent not on more and better food but on clothes and houses. Abnormal conditions of family life are created.

In regard to the effect on women there are two schools of thought—one holding that there can be little objection to controlled emigration if women are considered as mothers are brought presents and clothes and if babies are born in the village the other school treats the situation more realistically—one old chief said a woman wants a man to live with more than the presents he gives her. The women under pressure of work become disheartened and careless. There are also repercussions affecting tribal authority the lazy and unenterprising males are left behind in the villages and the young men with changed views return from abroad and may not support their chiefs. Fears are expressed for the success of indirect rule built on these unsatisfactory foundations.

B. S. Platt

REVIEWS AND NOTICES

IOFF (I. G.) [*Questions of the Ecology of Fleas in Connexion with their Epidemiological Significance.*—116 pp With 9 text figs. [332 refs.]¹ 1941 Piatigorsk Ordzhonikidze Regional Anti Plague Station [5 roubles.] [In Russian.]

Since the pioneer work of VERJITSKI (1902-3) on the transmission of plague by fleas Russian investigators have continued to make valuable contributions to our knowledge of the epidemiology of this disease. Particular attention has been given to the study of fleas parasitic on wild rodents and of the part played by the former as vectors and of the latter as reservoirs of the human disease in the endemic regions of the Soviet Union.

In the present work the author has brought together all the available data on the biology and ecology of fleas in relation to their epidemiological significance especially in plague. Only a brief survey of the contents can be made in a review but it is sufficient to give an idea of the mass of information contained in this book.

An introductory section deals briefly with the epidemiological rôle of fleas in general. This is followed by a consideration of the behaviour of various infective organisms after ingestion by fleas, including the susceptibility of these insects to infection. The data on transmission of diseases by fleas are summarized in one table while another records the maximum periods of survival of different species of rodent fleas (from suslik and tarabagan marmots) when infected with plague bacilli. Further a description is given of the different methods of transmission of infections by fleas, while a special section is devoted to an evaluation of various species as vectors of plague (and some other infections) in connexion with their physiological and ecological peculiarities. Among the rodent fleas found in enzootic regions of U.S.S.R. the following represent experimentally proved vectors of plague: *Oropsylla silvatica* (from tarabagans) *Ceratophyllus* (*Cutellophilus*) *tesquorum* and *Neopsylla setosa* (from susliks) *Ceratophyllus* (*Nosopsylla*) *mokrzeckys* and *C. (N.) consimilis* (murine). A chapter is devoted to the habitats (hosts and their dwellings) and general bionomics of the adult and larval fleas. Other sections deal with the feeding habits and host-parasite relationships of Aphaniptera, their geographical distribution and the influence of climatic factors upon their bionomics. In connexion with the feeding habits the author records in a table the results of his own observations on the ability of fleas from various animals to bite human beings. Data are provided regarding the duration of life in fleas in its bearing on the preservation of infection (especially plague) in them. A chapter is devoted to locomotion and migrations in these insects. This is followed by an account of the fluctuation in the numbers of flea populations and of the factors involved, and finally the natural enemies and methods of destruction of both fleas and their rodent hosts are dealt with.

It should be emphasized here that throughout the entire description the various facts concerning fleas and their ecology are closely correlated with the epidemiology of plague.

There are only nine text figures (mostly photographs) the value of which is somewhat diminished by defective reproduction. The bibliography comprises 332 titles (including 154 Russian papers). An alphabetical index is lacking but this is to some extent compensated for by the provision of a very comprehensive table of contents.

There can be no doubt that this book will serve as a useful guide to all those who are engaged in anti-plague work—medical officers, bacteriologists and entomologists—as well as to ecologists in general. Non-Russian workers will probably appreciate the compilation of local data which are not readily accessible in the scattered original publications.

C. A. HOAR

HARLEY (George Way) [M.D., Ganta Dispensary, Liberia]. *Native African Medicine. With Special References to Its Practice in the Mano Tribe of Liberia.*—pp. xvi+294. With 1 plate & 1 map. 1941. Cambridge Mass. Harvard University Press. [21s.]

In his introductory note Carleton S. Coon, Assistant Professor of Anthropology at Harvard University, remarks on the author's "rare

ability to live in and describe a second world. Dr Harley a Native American has done this with great insight accuracy and completeness after years of medical practice among the Mano people of Liberia.

Thanks to anthropological studies at the Kennedy School of Missions before he sailed which taught him not to regard the native medicine man as a devil doctor and epitome of everything evil sinister and reactionary and also to a course in Tropical Medicine at the London School and Botanical Studies at Kew he and Mrs Harley prepared themselves for a serious task. As a medical missionary he was an anthropologist who stayed long enough to accomplish it.

He has read widely and reviews in a supplementary chapter the subject in Africa as a whole. But his findings and conclusions among the 200 000 Mano are remarkably true and typical.

The primitive African starts from the conviction that disease is unnatural and results from intrusion from outside. Without it man might live for ever. Being logical he must ask the question why and whence it comes and has to hazard an answer without scientific knowledge of cause and effect. Common diseases (Oh everybody has that!) do not excite speculation and are treated more or less rationally by the sufferer and his family. Less common conditions require the help of a neighbour or specialist while the more obscure or deadly can only be dealt with by a diviner. Finally the poison ordeal is the super-specialist in diagnosis but is also judge jury and often executioner as well.

Medicine (*nyo*) is defined as man controlling nature. This can be done by using the spirit or power in animate or inanimate objects. The particular virtue of such power may be suggested by its property of strength endurance or shape or by its stimulation of the sense of taste touch or smell which has probably accounted for its selection among thousands of competitors for a place in the Pharmacopoeia. Thus a sort of homoeotherapy is evolved based on the homoeopathic principle that like cures like though the resemblance may be only superficial it serves to show how suggestible are doctors in all ages.

The spirit world however constitutes the all-important addendum to the Pharmacopoeia, and magical causes need magical remedies.

Perverted or degraded *nyo* is medicine used for antisocial purposes e.g. witchcraft.

Harley rightly emphasizes that witchcraft is the African's explanation of unknown disease. It is not a cause of disease even by suggestion though the author admits that the fear of it may contribute to the patient's morbid condition. Where witchcraft is a genuine pathological agent it acts simply by poisoning.

Treatment is described under the three headings of rational magical and mixed but the distinction is difficult and is not made by the natives.

The good doctor (*zo*) is one who has good medicine though qualifications either hereditary or acquired are expected also. Women are the general practitioners and men usually the specialists. These men and women have a vast store of knowledge and practical sense mingled with sheer nonsense. Of the former a bark found to contain quinine and given for fever and the inoculation of powdered snake head to immunize against snake bite are examples while eating rice in which a frog has been boiled is the senseless homoeotherapeutic remedy for curing the croak of whooping cough.

Divination is critically analyzed and exposed. The Sassafras ordeal is described in detail, and the specialized medicine of the male and female initiation ceremonies and of the Snake societies is outlined.

Botanical lists and names are given throughout, and a full index and bibliography complete a most readable and informative volume which should be in the hands of every medical man and most others called to live and work among Africans. *C C Chesterman*

STAFFER (I) [Professor & Head of the Dept of Medicine Peking Union Medical College] Chinese Lessons to Western Medicine. A Contribution to Geographical Medicine from the Clinics of Peking Union Medical College. With a Foreword by George R. Minot Professor of Medicine Harvard University—pp x+390 With 132 figs 1941 New York Interscience Publishers, Inc., 215 Fourth Avenue 22

The title of this book is somewhat misleading. It suggests that its contents refer to China as a whole whereas it is based almost entirely on experiences in North China (Peking).

Dr George Minot contributes the foreword and points out that while certain medical institutions have been established in China to convey the knowledge of Western Medicine to the East, it has only recently been realized that China has much to contribute to the West.

The first Section dealing with conditions of avitaminosis and calcium imbalance receives considerable attention. This is quite right and proper for osteomalacia and its allied conditions are remarkably prevalent in North China.

A large section is devoted to Infectious Diseases including insect borne diseases.

Malaria is only just referred to but the author points out that while natural infection with the subtertian parasite is very rare in North China, the disease is frequently conveyed by injections in heroin dens. It is common for heroin addicts to receive the drug by direct injection into a vein and frequently there is no attempt to sterilize the syringe. Rabies is included in infectious diseases while tuberculosis is given a separate chapter of ten pages.

An interesting chapter is that on Diseases of the Liver. Banti's syndrome first described in Northern Italy is found in North China and the details of several cases are described.

The various types of anaemias met with are carefully noted and attention is drawn to the peculiar incidence of pernicious anaemia in North China. The author points out that DE LANGE and LICHTENSTEIN affirm that pernicious anaemia is very rare in Malaysians and port Chinese. He states that it does occasionally occur in the well-to-do and records given in this book appear to confirm this view.

This book is a valuable contribution from North China, is most interesting and has the advantage of a good index.

H Gordon Thompson

BARBER (C H) [D.S.O. M.A. D.M. (Oxon) M.R.C.S., L.R.C.P. etc.]. Tropical and Sub-Tropical Diseases. Oxford War Manuals. General Editor The Rt. Hon. Lord HORDER, G.C.V.O.—pp x+189 With 29 figs 1942. London Humphrey Milford, Oxford University Press. [5s.]

The object of this book is "to supply in concise and portable form the up-to-date salient facts required by those who are up against

tropical and Oriental diseases. It is concise and portable indeed it fits the pocket but much of the information given is not up to date and there are many omissions some of them important. There is a list of countries and the diseases prevalent in them yet in Algiers and Egypt there is no mention of typhus though this disease appears under the heading of North Africa and Libya. There is no mention in this section of malaria in the Pacific Islands of cholera in Siam of plague in Egypt or of yellow fever in the Sudan. In Malaya tick typhus is noted but there is no mention here of flea or mite typhus.

In general the descriptions of disease are very brief and suffer accordingly though no doubt much of the information is accurate. On the other hand there is little excuse for some of the errors and omissions. *Anopheles costalis* has been known for many years now as *A. gambiae*. NNN medium is described as Agar sod. chloride and water with no mention of blood there is no reference to *Glossina tachinoides* in the spread of trypanosomiasis it is said that the tsetse fly does not stray far from water a statement which of course does not apply to *G. morsitans*. thyroid enlargement is given as a symptom of Chagas's disease though most authorities have long considered that there is no causal relationship between the endemic goitre and the trypanosomiasis, which happen to coincide. the sulphonamides are constantly referred to as the sulphanilamides—for instance the sulphanilamides in the form of sulphapyridine. in the theories of causation of sprue are included the dry rot and Monilia theories surely now long dead. *Wuchereria bancrofti* is described as *Filaria Bancrofti* (or *Wüchereri*) and its transmission is said to be due to the *Stegomyia mosquito* or *Culex fatigans* (*Aedes variegatus*) there is no mention of *W. malays*.

There is lack of uniformity in nomenclature and in the italicising of specific names. the names *E. histolytica* and *E. coli* and *A. H1ST* and *A. COLI* appear on the same page. The illustrations are all line drawings and are not good.

It is not easy to write a short account of tropical medicine but in spite of the fact that some of the clinical descriptions in this book are adequate and that reference is made to a considerable amount of recent work the reviewer is left with the impression that this work is not enough to meet the requirements of those going to the tropics and that it does not present the subject in such a manner as to make sufficiently clear the broad principles which facilitate understanding.

C IV

PINEY (A.) [M.D. M.R.C.P. Physician St Mary's Hospital for Women and Children London etc.] *Synopsis of Blood Diseases.*—pp ix+120. With 1 chart & 4 coloured plates. 1942. London. William Hememann Medical Books Ltd. [10s 6d]

After a brief account of blood formation the author describes the classical megalocytic, hypochromic and haemolytic anaemias. Then follow descriptions of the anaemias of infancy and childhood hypoplasia of the blood forming organs the haemorrhagic diseases the leukaemias polycythaemias and the diseases of the spleen. Succeeding chapters deal briefly with symptomatic blood changes and the blood pictures encountered in various infections, but in this section there are some unexpected omissions as for example, the comparative

leucocyte counts in infective hepatitis and Weil's disease which are so useful in early clinical differential diagnosis. A glossary of haematological terms a few references and two tables giving the characteristics of the various blood and marrow cells terminate the book. Four coloured plates are given but their impressionistic style limits their value. The author states the book is intended to give as much information as the average physician and general practitioner will need it will form a useful and handy book of reference in routine practice.

F Murgatroyd

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES
BULLETIN

Vol. 39]

1942

[No 11

SUMMARY OF RECENT ABSTRACTS *

IX LEPROSY

Epidemiology

A number of surveys are included in the reports under review. For clarity and convenience the findings are set out in tabular form —

Leprosy Surveys

Authors	Page	Locality	Incidence per 1 000 population	Proportion of lepro- matous cases per cent.	Proportion of child cases to total cases per cent.
DAVEY	21	S Nigeria	33		
DEGOTTE	458	Belgian Congo Ituri	52.9	8.61	10.35
MALHOTRA	698	Punjab (Kangra district)	1.0	54	8
HAYWARD	456	Rajputana	0.8	43.81	5.4
CHANDY	698	United Provinces Fyzabad		about 33	
LOWE & SANTRA	21	N Bengal	74	4.1	low
BURER	217	Burma Shan villages Lahu villages Chinese village	36 142 Nil	37.8	
MALAIHOLLO	457	W Java	38	11	
ARAÚJO & DE ALBUQUERQUE	458	Rio de Janeiro Native Brazilians Brazilians born of foreigners Foreigners			37.9 45.0 5.0

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1941 Vol. 38. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

No general deductions can satisfactorily be drawn from this table beyond the bare facts of incidence. There seems to be no constant correlation between high incidence and the proportion of lepromatous cases, nor between high general incidence and the proportion of cases in children.

The high incidence in the Belgian Congo is shown by the fact that during 1939 there were 74,397 known cases, 10 000 of which had been discovered during the year. Incidence rates for the Ituri district are given by DEGOTTE (p. 458, see table above).

In Ceylon, DE SIMOX (p. 456) reports that 85 per cent. of cases are found within 5 miles of the humid coast in the area which is most densely populated.

MALAINHOLLO (p. 457) notes that in Wates, W. Java, leprosy appears still to be spreading though in general it is benign in character. There is a high rate of household contact cases.

ARAUJO and DE ALBUQUERQUE (p. 458) find that a high proportion of leprosy cases occur in childhood in natives of Brazil, but that in immigrant foreigners the highest incidence of onset is in adult life. They argue that foreigners from countries where leprosy is no longer endemic are as susceptible as, or even more susceptible than, the children of endemic areas. MOTTA and COSTA (p. 699) in the district of Rio de Janeiro note that of the cases recently investigated, 5.2 per cent. were in children [but they do not state what proportion of the adult cases started in childhood] and that of the total cases 64.7 per cent. were in an infective state.

From a consideration of the leprosy in New Brunswick, Louisiana and Minnesota, AYCOCK (p. 21) concludes that in these areas hereditary susceptibility is a major factor in propagation rather than family contagion. [This is not a common opinion: most workers consider that close contact is a more potent force than any other in the epidemiology of leprosy.]

ROGERS *et al.* (p. 20) contribute a note on the lepers at present known in the British Isles.

Aetiology

COLLIER (p. 22) has made a contribution to the subject of the influence of a diet of *Colocasia* on the incidence of leprosy: a subject which has been stressed in recent years by German workers. In a preliminary report on experiments with monkeys he states that in animals fed on a diet of *Colocasia*, or receiving injections of sapotoxins, the inoculation of human leprosy material produced lesions which were not found, at the time of writing, in controls. A fuller account of the experiments is given on p. 459.

Attempts to infect animals with material from cases of human leprosy have been made with varying degrees of success. DHARMENDRA and LOWE (p. 217) have been unable to confirm the work of ADLER and BURNET in that they have failed to produce progressive infection in Syrian hamsters by inoculation of human leprosy material whether splenectomy had been carried out or not. ARAUJO (p. 218) however found numerous leprosy bacilli, in small groups, in the blood, liver, spleen, kidneys and axillary glands of a hamster (*Cricetus cricetus*) inoculated subcutaneously one month before with material from a human leproma. NOXAKA (p. 224) has injected human leprosy material into chickens and reports some leprosy

changes in liver and spleen as well as at the site of injection. These changes occurred but more slightly on subinoculation to another fowl but the third generation failed to produce lesions. Heated material did not produce visceral changes. OTA and NITTO (p 461) have however obtained better results and have subinoculated human leprosy material through seven passages in hens by intramuscular injection. They describe their technique. The affected muscles contained yellow spots and acid fast bacilli were found in large numbers. These changes increased slowly and persisted for more than one year but in later passages the lesions developed more quickly. Round-cell infiltration and large vacuolated cells containing acid-fast bacilli were demonstrated that the bacilli were not tubercle bacilli was proved by the negative results of guinea-pig inoculation and culture experiments. The authors consider that their method furnishes the essentials for chemotherapeutic experiments to find a more effective treatment than is at present available. These authors (p 462) have used the tissues of hens (of the second and fifth passages) for the preparation of lepromin and have succeeded in human leprosy in obtaining results with this lepromin almost equal to those found with the original Mitsuda reaction.

CHAUSSINAND (p 699) has attempted to cultivate *Mycobacterium leprae* on a large number of media. All the experiments failed with the exception of one in which a growth believed to be that of the leprosy bacillus was obtained. Subculture however was unsuccessful. The composition of the medium is to be described later.

Pathology

COWDRY (p 23) discusses the development of the globi or masses of leprosy bacilli in the giant (foam) cells. He concludes that these giant cells are derived from components of the reticulo-endothelial system.

STEIN (p 221) draws attention to an affection of the follicular structure of the skin in leprosy which though not previously described he has seen in one-third of his cases. There are yellowish brown sunken follicular spots with atrophic epithelium and specific granulomata with lepra cells and bacilli which rapidly destroy the hair follicles. They are commonest on the legs and may be the starting points of lepromatous granulomata.

PRENDERGAST (p 465) has made a study of the eye in leprosy. The cornea is the most vulnerable tissue and commonly shows infiltration of the deep layer of the stroma. The iris may become fibrotic and atrophied, but in the ciliary body and sclera the lesions are less extensive in the retina, optic nerve and lens they are rare.

TORSSUJEV (p 462) discusses the changes which take place in the cutaneous nerves in leprosy. These cannot be further detailed.

In nerve leprosy OBERDOERFFER and COLLIER (p 220) found by X ray examination that bone atrophy took place in bones the muscular insertions of which were supplied by the nerves most frequently damaged by the disease. They assume that the disturbances of nutrition which cause these changes are due to inactivation of the muscles concerned and advocate purposive training of those muscles.

Clinical findings

DAVEY (p 706) has followed the course of the disease in 118 lepers in Nigeria who did not receive any treatment during the period of the

investigation, which lasted for two years. There were 18 deaths, six of them from smallpox but 67 per cent. of the remaining cases were stationary or had improved at the end of the time. Most of those in which there was improvement were of the neural or tuberculous type.

During recent years the frequency with which leprosy may be abortive has increasingly been emphasized, and LOWE and CHATTERJI (p 701) draw attention to the fact that such cases are common in India. Most of these cases are of the neural type and a description of one is given. Leprosy rarely commences late in life, and when it does, is usually mild. The same authors (p 701) describe the onset of a case in an Indian aged 70.

WADE (p 464) notes that it is rare for the tuberculous form of leprosy to be transformed into the lepromatous type but in relapses the bacilli become more numerous in the lesions and this may lead to the suspicion that the form is lepromatous. COCHRANE (p. 484) also supports this view pointing out that his patients who became lepromatous were probably not tuberculous in the first instance because they had been consistently negative to lepromin. These cases he describes as intermediate and gives in a table the differential characters of tuberculous and intermediate cases. VELASCO (p. 702) however records two cases in which tuberculous lesions developed into the lepromatous form. Such cases are rare. LOWE and CHATTERJI (p 700) have enquired into the development of lepromatous cases and find that two-thirds of the cases investigated started with lesions which suggested disease of the neural type. Some apparently developed from tuberculous lesions but in view of the frequency of tuberculous disease in Calcutta they consider that major tuberculous lesions rarely become lepromatous (this agreeing with WADE and COCHRANE above). The average duration of the neural phase is 3-4 years, and neural cases of long standing rarely become lepromatous.

HOFFMANN (p 227) draws attention to possible mistakes in diagnosis due to the finding of non-pathogenic acid-fast bacilli, originating from soil or water in the nose, mouth, urine or in ulcers of the limbs. Leprosy therefore should not be diagnosed in the absence of clinical symptoms. Such saprophytic bacilli may often be cultivated on ordinary media, and thus provides a good differentiation from leprosy bacilli. Their morphological appearances differ from those of *Mycobacterium leprae*. (It is worth remembering that acid-fast bacilli may be found in the scrapings from cold water taps and in old collections of distilled water. Water used from such sources and in procedures which involve centrifugation is likely to yield acid fast bacilli in the sediment, and these may wrongly be attributed to the substances examined.)

DHARMENDRA and BOSE (p 702) have carried out complement fixation tests in leprosy using as antigens preparations of six acid-fast bacilli including the so-called leprosy bacilli of Duval, Bayon, Kedrowsky and Llera. They conclude that these tests have not given, and are unlikely to give any evidence regarding the genuineness of cultures of organisms isolated from leprosy lesions. (It will be remembered that LEPAS ACOSTA (this Bulletin 1938, Vol. 35 p. 531) isolated an acid fast bacillus from cases of leprosy and obtained a high proportion of positive results in lepers with a complement-fixation test in which this bacillus was used as antigen. SAEZ (*ibid.* p 587) however obtained similar results with an acid fast bacillus isolated from tap water and other workers have achieved positive reactions with other saprophytic acid-fast bacilli.

EAGLE *et al* (p 703) confirm the results reported by CAPPELLI that in leprosy the complement fixation test in which the antigen is a suspension of cultured *Spirochaeta pallida* is negative. By the use of this test therefore the frequently positive Wassermann reactions found in non-syphilitic lepers can be differentiated from the true syphilitic reactions in which there is response to both tests [but see KOLMER *et al Bull of Hyg* 1942 Vol 17 p 726].

The *lepra reaction* is regarded by many workers as an allergic phase of the disease. Thus ERMAKOVA (p 25) from histological examination of lepromatous material taken during the stage of lepra reaction considers this state to be a manifestation of allergy. A description of the findings is given. Similarly BÜNGELER and FERNÁNDEZ (p 219) describe the histological appearances in the spontaneous reaction of tuberculoid leprosy and in reactions in the same condition artificially induced by means of lepromin. These appearances lead the authors to the conclusion that tuberculoid leprosy is essentially a state of permanent hypersensitization with a high degree of immunity against leprosy infection. NOLASCO (p 25) however differs from these workers in his view of the nature of the lepra reaction. He found the lepromin test to be positive in only 4 of 48 lepromatous patients tested while in the state of lepra reaction. There is apparently no relationship between the intensity of the test and the presence of the lepra reaction and the author cannot from these findings support the view that the lepra reaction is a manifestation of allergy. He (p 220) gives a description of the histological appearances at the site of injection of lepromin in lepromatous cases in the state of lepra reaction.

ARCHER (p 222) noted a greatly increased proportion of lepra reactions in the inmates of a leper home shortly after vaccination against smallpox. The reactions were more severe than usual and all occurred in patients who had been vaccinated.

COCHRANE *et al* (p 703) state that it can generally be concluded that the *lepromin reaction* gives an indication of the allergic response of the tissues of the body to the bacillus of leprosy or its products. In a series of tests carried out in a leprosy sanatorium they found positive results in 60 per cent of neural cases, 100 per cent of tuberculoid cases and in 88 per cent of healthy persons. No case of lepromatous disease was positive. Leprous children with a history of contact tend to show fewer positive reactions the more close the contact but healthy children of lepers are often positive. There is evidence that the lepromin reaction is not significantly influenced by possible family predisposition. The authors consider that the more intimate the contact in early life the more likely is cellular resistance to be broken down.

BERNY and MAUZÉ (p 24) describe an intradermal test which they have found to give positive results in all the lepers tested (in all stages of the disease) but not in any of the controls. The antigen is an alcohol precipitate of the urine of patients with leprosy dried and redissolved in saline to this solution ammonia is added and after filtration it is adjusted to pH 6.4-6.6.

Treatment

MUIR (p 223) notes that in nerve cases there is high tissue resistance with intense cellular reaction, whereas in lepromatous cases resistance is deficient. Treatment of lepromatous cases, therefore, should aim at

stimulating the tissue cells and in this measures to improve the general health are important. A summary is given of the drugs commonly used, but it is admitted that their actions are not fully understood. The same author (p. 223) gives details of treatment of the nasal cavities in leprosy.

COLLIER and McKEAN (p. 28) instituted a treatment of leprosy with diphtheria antitoxin or toxoid, which was based on the theory advanced by OBERDOERFFER, that suprarenal insufficiency predisposes to leprosy infection. It is known that diphtheria toxin damages the suprarenals, and antitoxin therefore may protect them. It was in the hope that diphtheria antitoxin might neutralize leprosy toxin in the toxæmic stage of the leprosy reaction, that its use was commenced. Toxoid was tried later. In about 50 patients who were experiencing repeated lepra reactions, treatment with antitoxin gave good results, with reduction of nodules, rapid improvement of the reaction, return of sensation to previously anaesthetic areas and fragmentation of bacilli. In controls treated with anti-tetanus serum or antivenene no such improvement was found. Diphtheria formal toxoid produced results as beneficial as those given by antitoxin.

The best results were obtained in lepromatous cases but improvement was seen in nerve cases also. In comment however the Editor of the *Leprosy Review* notes that in a control series COLLIER subsequently reported that under chaulmoogra treatment alone a somewhat similar result was obtained.

In a later communication COLLIER (p. 704) reports that in over 600 cases of leprosy treated with diphtheria toxoid the results far exceed any achieved by other means.

MOISEW (p. 704) however obtained such poor results with diphtheria anatoxin (Ramon) in a small series of cases, that he was compelled to stop the treatment at the request of the patients. In a comment to this paper ROGERS notes that unpublished results from other workers do not confirm the claims of COLLIER and his co-workers, and that the use of chaulmoogra is apparently more efficacious. [Further reports summarized in this *Bulletin* 1942, indicate that toxoid treatment has not found much favour and that there is lack of any proof that in leprosy there is any deficiency of suprarenal function.]

COLLIER (p. 487) working on Oberdoerffer's theory that the essential predisposing factor in leprosy is adrenocortical insufficiency enhanced by adreno-toxic sapotoxins from food plants [especially *Colocasia*] has treated leprosy by diathermic stimulation over the kidney region, and reports definite improvement and a reduction in the incidence of lepra reactions.

DAVISON (p. 466) has obtained some evidence of improvement in neural cases of tuberculoid type from the use of Grasset's endotoxoid prepared from *Mycobacterium tuberculosis* by repeatedly freezing to -30°C . The assumption was that there may be a group antigen common to both leprosy and tubercle bacilli.

KUDRIZOV (p. 705) writes of the value of the naphthalan oil baths used in the Caucasus. The treatment is reputed to give stable results in almost all cases with more rapid improvement than with any other treatment employed.

DAVISON (p. 705) has used blood transfusions in treatment but has found no evidence of permanent benefit from them.

COCHRANE *et al* (p. 27) note that wheat in place of rice in the diet of lepers in India appeared to afford relief from the painful neuritis and

from bone and joint pains without causing improvement in the lepromatous condition.

BALIÑA and BASOMBRIO (p 705) have been favourably impressed with the results obtained by the removal or destruction by electrical methods of solitary lesions in tuberculoid leprosy. All the patients received regular chaulmoogra treatment as well.

In the treatment of eye lesions PRENDERGAST (p 465) has found protein shock useful in the acute stages. Quinine bisulphate ointment and thyroxin applied locally are useful in clearing up corneal infiltrations.

MUIR (p 706) advocates the treatment of lepromatous ulcers by means of local applications of gentian or methyl violet followed by 10 per cent silver nitrate and finally by 15 per cent tannic acid. With this treatment the ulcers rapidly began to heal.

The packing of perforating ulcers with urea, or the instillation of a saturated solution into sinuses has proved successful in the hands of SLOAN (p 706) in a high proportion of cases.

Control

In the *International Journal of Leprosy* (p 27) there appeared an editorial devoted to the subject of travel by lepers and the laws governing this question in various countries. The opinions of a number of authorities on leprosy are cited these cannot be abstracted further but the general impression is that the regulations at present in force limit the movements of lepers in ships and railways and restrict immigration of lepers, to an unnecessary degree.

DAVEY (p 21) gives an account of the control work carried out by the Uzuakoli Leper Colony in S. Nigeria. From this centre, clinics and segregation villages have been instituted over a large area and regular visits for purposes of treatment are paid to these places by the staff of the central institution. Obvious improvement in the condition of many patients has taken place. At each clinic there is a leper nurse, and leprosy inspectors are being trained. Courses in leprosy are given to sanitary inspectors and to school teachers.

Village segregation is practised in an area of S.E. Nigeria, and DAVEY (p 706) reports that over a period of two years the incidence of the disease fell appreciably probably owing to the isolation measures. He notes that these measures were begun by the natives themselves 10 years ago and that the isolated persons live happily in the model village they have constructed. In the Belgian Congo (p 457) segregation is only partially employed, but the authorities are aiming at isolation villages of not more than 400 inhabitants with land for agriculture dispensaries and hospitals. These will subsist on their own resources and will be administered according to local custom. DEGOTTE (p 458) gives an impression of the value of village isolation in the Belgian Congo. Where this has been carried out with efficiency the cases are only one-third as numerous as elsewhere. He concludes that village isolation is the best method of combating leprosy in the area with which he is concerned. HAYWARD (p 456) considers that leprosy is not decreasing in the State of Jodhpur. The resources of the State cannot at present, afford the means for isolation of all the known cases and the author therefore advises the institution of small colonies in the villages so that at least partial isolation can be carried out with treatment as out patients at existing

hospitals and dispensaries [much after the manner of the Uzunokoll organization in Nigeria]

In Ceylon compulsory segregation has been abandoned since 1932. DE SNOON (p. 456) reports that repeated examination of all contacts is now carried out and that home isolation is permitted in certain cases. Patients discharged after bacteriological findings have become negative are regularly supervised in their homes. Leprosy hospitals and settlements have been established, at which modern treatment is given. MALAIRIOLLO (p. 457) notes that in Java some of the lepers have of their own initiative adopted the practice of house isolation: this system is to be encouraged.

SITANALA (p. 28) notes that in the Netherlands Indies there are 47 leprosanaria harbouring about 5 000 lepers.

ROGERS (p. 707) shows that in Korea where male lepers refuse to enter colonies unless accompanied by their wives and where therefore, children are born, the problem has been solved by voluntary sterilization of the men. At a leper colony in Burma BURKE (p. 28) notes that homes are provided for uninfected children, and that any male leper in the colony who wishes to marry must first be sterilized. He reports that there are now 10 colonies in Burma (p. 217).

ARAUJO (p. 224) gives an account of the leprosy preventoria in Colombia.

Charles Wilcocks

MALARIA

RAM (L. M.) Malarial Survey of Stann Creek District with Relevant Observations on the Incidence of Malaria in British Honduras.—*Jl Trop Med & Hyg* 1942 Feb 2 Vol 45 No 3 pp 18-24 With 3 charts & 4 maps

Stann Creek is one of the five districts of British Honduras, and has a mixed population of 6,347. The average (1935-39) birth rate was 32, the death rate 16 and the infant mortality rate 100. Malaria is more widespread and severe in Stann Creek than in other districts of the colony. The spleen rate of 1,214 school-children in 1940 was 22 per cent. *P. falciparum* is more prevalent than *P. vivax* in the proportion of three to two. Occasional infections with *P. malariae* are found July to October is the season of most active transmission. Six species of Anophelines have been found in the Stann Creek District.—*A. albimanus* and *A. stephensi* are the most widely distributed. *A. darlingi* has been found only in certain rural areas in Stann Creek and Toledo Districts. One naturally infected specimen of *A. tritaeniorhynchus* was found.

Norman White

VENHUIS (W. G.) *Anopheles acutus* van kuhlwarden [A. acutus on stream banks].—*Geneesk. Tijdschr. p. Nederl. Indis* 1942 Jan 20 Vol 82 No 3 pp 89-112 With 3 figs on 1 plate [15 refs] English summary

After the description in a previous article of the capture of many in maculatus on stream-banks in the present article a description is given of the case with which *An. acutus* in East Java.

on stream-banks in great numbers sometimes far more than in houses.

On two occasions the vector species could be found only by making use of the stream-bank catches.

Besides *An. maculatus* and *An. aconitus* the following species are apt to be found on stream-banks *An. minimus* var *flavirostris* *An. kochi* *An. leucosphyrus* *An. tessellatus* and *An. vagus*. On the other hand *An. barbirostris* *An. hyrcanus* *An. annularis* and *An. subpictus* are seldom seen and seem to have still other day resting-places.

There is much evidence that the success of catches in natural shelters depends on the presence or absence of suitable resting places in houses and stables and whether steep dark and damp stream-banks are available or not.

In the literature sometimes natural shelters are mentioned as day resting places and sometimes very good results have been reached.

Nevertheless the search for anopheles adults in natural shelters has not drawn the attention it deserves.

So the adoption of a method by which the combination of house stable- and stream-bank catches is practised is strongly emphasised.

VENHUIS (W. G.) Geïnfecteerd *Anopheles minimus* var *flavirostris* aan kalmheden. [Infected *A. minimus* var *flavirostris* on the Banks of Streams].—*Geneesk. Tijdschr. v. Nederl. Indië* 1942 Feb 3 Vol. 82, No. 5 pp. 190-194. English summary.

During a survey at the end of an epidemic presumably caused by *A. aconitus* 258 *A. minimus* var *flavirostris* were captured on stream banks. 235 midguts were dissected and 3 of these showed a fair number of middle-sized oocysts. No sporozoites were found.

In the last months 5 midguts of this variety showed oocysts four from stream banks and one from a house.

In the course of four years from 1937 to 1940 inclusive in East Java 511 midguts and 673 thoracic fluids of *A. minimus* v *flavirostris* from houses and stables only were examined and none of them was found infected except one midgut in October 1940.

Usually the adults of this variety are rare in houses and few in stables even when larvae are abundant in the vicinity.

Still the variety seems to be less wild than was thought for East Java because the adults are easily captured on stream banks and amongst these infected specimens were found.

CORRÊA (Renato R.) & RAMOS (Alberto da S.) Do encontro do *A. (N.) darlingi* Root 1926 e do *A. oswaldoi* var *metcalfi* Galvão & Lane 1937 naturalmente infetados com os parasitas maláricos na região sul do estado de São Paulo. [*A. darlingi* and *A. oswaldoi* var *metcalfi* found Naturally Infected in the Southern Part of the State of São Paulo].—*Folia Clin. et Biol.* São Paulo 1941 Vol. 13 No. 6 pp. 183-191. With 5 figs. [11 refs.] English summary.

In the southern part of the State of São Paulo *A. darlingi* was the prominent anopheline captured in houses in Taquari near the bank of the river of the same name. Oocysts were found in two of 33 females dissected. This species was found breeding along the margins of the Taquari River among the leaves of *Eichornia azurea*.

In two places in the Rubelra District *A. oswaldoi* var *metcalfi* could readily be captured biting man in the proximity of houses though it was not found inside human dwellings. Of 24 so captured and dissected, two harboured oöcysts.

Two excellent photographs of the eggs of these two species of *Anopheles* are reproduced. Norman White

COUTINHO (J. O.) *O Anopheles (N.) oswaldoi metcalfi* Galvão e Lane 1937 e o *Anopheles (N.) albitarsis* Arnibalza, 1878 como transmissores de malária no Distrito Federal. [*A. oswaldoi metcalfi* and *A. albitarsis* as Vectors of Malaria in the Federal District.]—*Brasil Medico* 1942, Jan. 31 Vol. 58, No. 4 & 5 pp. 52-55 With 3 figs. [11 refs.]

This paper opens with a discussion of the validity of the species *A. oswaldoi* and its relationship to *A. larissimaculatus*. The author considers that the *metcalfi* variety of *A. oswaldoi* described by GALVÃO and LANE in 1937 is a valid species; its eggs differ from the description given by ROOR 1926. In the neighbourhood of Lake Tijuca in the Federal District of Brazil, in November and December *A. oswaldoi* formed 78 per cent. of the Anophelines captured in houses, and 83 per cent. in pig-sties. *A. albitarsis* constituted 19 per cent. of the anophelines caught in houses and 3-4 per cent. in pig-sties. Oöcysts were found in 9 of 307 *A. oswaldoi metcalfi* dissected, and in 1 of 180 *A. albitarsis*.

Norman White

HOWE (W. H. W.) The Species of *Nyxorhynchus* Confused under *Tarsimaculatus* Goeldi, and a New Name, *A. emiliaensis*, for One Species found in Para, Brazil (Diptera, Callitidae).—Reprinted from *Ann. Entom. Soc. America*, 1941 Dec. Vol. 34 No. 4 pp. 791-807 With 8 figs. [22 refs.]

ROSINGER (Z.) Preliminary Notes on Malaria Resistance.—*East African Med. J.* 1942 Feb Vol. 18 No. 11 pp. 324-335

This is an interesting discussion covering a wide range. No new facts and but few original observations are recorded but the author writes from large experience. Malaria prophylaxis, malaria treatment, biological resistance to malaria, and immunity are considered, but it is not possible to summarize a discursive contribution of this kind. The questions raised confirm the impression "that our continuous emphasis on attempts to solve the malaria problem by endless work and discussion on prophylaxis and the comparative efficiency of the different malaria drugs have led us into a *cul-de-sac* and that in looking for a way out of it, we are using up valuable time and energy part of which could more profitably be employed in investigating humoral pathology, serology and the problem of immunity in malaria." Norman White

PRIST (Robert) Meningococcal Septicæmia resembling Malaria. [Memoranda]—*Brit. Med. J.* 1942 Aug 1 p. 129 With 1 chart.

The patient was a soldier who had never served outside the United Kingdom. The chart of his temperature shows marked periodicity strictly quartan in type (except on one occasion) with remissions to normal between the peaks. The patient complained of pain in the splenic area. Malaria parasites were not found in the blood and the

fever did not respond to quinine. On two occasions erythematous spots were seen on the abdomen and there was a suggestion of erythema nodosum on the legs during the paroxysm there was leucocytosis to 22 000 with polymorphonuclear increase. No meningococci were cultured from the blood but the fever responded dramatically to sulphapyridine. A diagnosis of meningococcal septicaemia seems to be justified [though definite proof is lacking] and the author recalls the rule when you see erythema nodosum, think of meningococcal septicaemia.

[It should also be borne in mind that quartan malaria may be transmitted by the transfusion of blood from a donor who has had that disease even though no parasites may be seen in stained films and even though many years may have elapsed since residence in a malarious area. In blood stored at low temperatures parasites may live for days or even weeks. See this *Bulletin* 1940 Vol 37 pp 362 456 1941 Vol 38 p 505]

For a further comment on this case see the note by Sir John MEGAW on the paper by JACOBI below p 758.] C W

YORKE (Warrington) *The Diagnosis and Treatment of Malaria in England.*—*Brit Med J* 1942. July 18 pp 61-63 With 6 figs

In this concise paper the author deals with the clinical aspect of malaria bringing out with clarity the essential features of the three principal forms and emphasizing the seriousness of malignant tertian fever. The standard treatment adopted at Liverpool consists of 10 grains of quinine sulphate (with *m.xc.* acid sulph. dil. in $\frac{1}{2}$ oz. of chloroform water) three times a day for four days followed by 20 grains of quinine each Saturday and Sunday for eight weeks. If the patient is gravely ill, the oral treatment should be preceded by an intramuscular injection of 10 grains of quinine dihydrochloride. In cerebral malaria with deep coma 10 grains of dihydrochloride in $\frac{1}{2}$ -1 pint of hypertonic saline (3 per cent) should be injected very slowly into a vein and if the patient is still unconscious in 12 hours this may be repeated, though the outlook in such cases is bad.

Mepacrine [atebrin] may be substituted in doses of 0.1 gm. thrice daily for seven days, followed by 0.2 gm. on Saturdays and Sundays for eight weeks and preceded in severe cases by injections of quinine. At the present time when it is important to conserve quinine mepacrine should be used whenever possible there is some evidence which suggests that it is a more effective suppressive than quinine. Toxic effects are few with the doses advised. [There is a fairly widespread belief in the general population that the continued use of quinine leads to sterility it might be well for medical officers to disabuse the minds of patients and of persons advised to take prophylactic doses of this false idea.] C W

NICOL (W D) & SHUTE (P G) *Economy in Quinine* [Correspondence]—*Lancet* 1942 May 2 pp 545-546.

Economy in the use of quinine is necessary the authors give the results of their experience in the treatment of induced malaria or of malaria in persons returned to Britain from an endemic area. The amount of quinine necessary for cure varies according to the species

of parasite hence the importance of first establishing a diagnosis. For *P. vivax* a single dose of five grains will abort an attack, and five grains once daily for 15 days will effect a cure of the febrile attack. Larger doses or extended treatment will not prevent relapses and this applies to patients bitten once by a single infected mosquito or by 100 infected mosquitoes daily for a week. In relapses even smaller quantities will suffice for cure. This experience was gained by the use of more than six strains of *P. vivax*.

P. falciparum infections require 10 grains daily for 10 days, and this dosage is adequate for mixed infections. The so-called anti-relapse treatment is useless. Quinine should not be given after the cure of the first infection until relapse occurs, and then only when diagnosis has been confirmed by blood examination.

[The authors have had great experience their method of treatment should be carefully considered in malarious countries.] C IV

PETROUX (William T.) The Relation of Plants to Malaria Control. With Special Reference to Impounded Waters.—*Public Health Rep.* 1942 Feb 20 Vol. 57 No 8. pp 261-268

This is another contribution to the literature of mosquito control that comes from the Tennessee Valley. Proper reservoir preparation and adequate reservoir maintenance result in lessened need for larvicides. Aquatic plants provide food and shelter for anopheline larvae. The paper gives a summary of plant investigations during the summers of 1937 to 1940.

Some trees withstand flooding others do not. A large number of American trees are classified according to their tolerance to flooding. All intolerant species should be removed before impoundment for some distance above the maximum pool level since dead trees or their parts constitute a mosquito hazard when they fall into the reservoir. Tree stumps produce new shoots. Clearing of a reservoir takes two or three years. Stumps in the marginal area may produce shoots of such a height as to create a mosquito hazard subsequent to the closure of the dam. Observations on the seasonal growth of coppice has enabled the time to be fixed for rebrushing, and thus eliminating this hazard. Willow stump poisoning may be essential the technique for this is described. Success has been obtained with arboricides that are but little toxic to men and cattle. Low cutting of stumps is necessary; coppice does not grow from completely inundated stumps.

Herbaceous plants offer more difficulties the life histories of the worst offenders are being studied, and the rates of colonization in relation to fluctuation schedules are being determined. Periodic cutting has given good results with cow-lily and lotus. Herbicides have been useful sodium arsenite is effective. Five other substances less toxic to man and domestic animals promise well an emulsion of sodium arsenite and fuel oil two fuel oils, and two phenolic compounds. Airplane application of powdered herbicides has opened up vegetation for more effective antilarval measures, and may possibly reduce plant growth sufficiently to obviate the use of larvicides.

Complete clearing to the maximum pool level and a thorough autumn clean-up just preceding wintertime impoundment are essential to effective mosquito control during the first two or three seasons in the life of a reservoir. Rigid control of obnoxious shoreline vegetation is almost synonymous with adequate reservoir maintenance. Norman White

MORRISON (Dempsey B) & ANDERSON (William A D) The Pigment of the Malaria Parasite—*Public Health Rep* 1942. Jan. 16 Vol. 57 No 3 pp 90-94 With 2 figs.

A careful investigation of the malarial pigment which is elaborated from the haemoglobin of the red blood corpuscles by *Plasmodium knowlesi* has confirmed the results obtained in a similar investigation of SINTON and GHOSH [this *Bulletin* 1935 Vol. 32 p 127] who concluded that the pigment was haematin or ferri haemic acid as the authors of the present paper prefer to call it. As did SINTON and GHOSH the authors found that the pigment can be dissolved without being denatured or altered by 0.5 N sodium carbonate solution. It is identifiable spectrophotometrically as haematin and yields haemin crystals and pyridine haemochromogen by appropriate treatment.

C M Wenyon

ANDERSON (W A D) & MORRISON (Dempsey B) Role of Parasite Pigment (Ferrihaemic Acid) in the Production of Lesions in Malaria. —*Arch Pathology* 1942. May Vol 33 No 5 pp 677-686 With 7 figs.

The authors have inoculated solutions of disodium ferrihaemate intravenously into monkeys with a view to comparing the lesions produced with those seen in monkeys which had died of *Plasmodium knowlesi* infections. These are qualitatively similar the changes noted at autopsy differing mainly in degree. The most significant of these are widespread thromboses in small vessels, degeneration of the renal tubules with cast formation and deposition of pigment in the reticulo-endothelial cells. It is thought that the mechanism of injury in simian malaria is anoxaemia due to vascular occlusion, superimposed on the severe anaemia already present. It does not appear that the parasite pigment is a specific toxic factor as it is not liberated in soluble form from the parasites. [See also this *Bulletin* 1942 Vol. 39 p 604]

C M Wenyon

RAY (J C) MUKERJEE (S) & ROY (A. N) Agglutination Reaction in Experimental Animals in Response to *Plasmodium knowlesi* Antigen. —*Ann Biochem & Experim Med* 1941 Vol 1 No 3 pp 207-218

The authors have tested the agglutinating properties of the sera of monkeys which have recovered from the acute stage of infections with *Plasmodium knowlesi* as the result of suitable treatment of such chronically infected monkeys as have been subjected to a number of superinfecting infections of parasites and of monkeys which have been immunized by the injection of vaccines of killed parasites. The sera were tested in various dilutions with freshly prepared antigen which consisted of infected red cells containing a high percentage of mature parasites in 100 volumes of physiological saline solution. The test was carried out in test tubes as in the standard Kahn test and the result observed macroscopically was controlled by microscopic examination. In a positive case there was macroscopic granule formation and microscopic agglutination of the cells containing mature parasites.

It was found that agglutinating antibodies appear in the sera of monkeys after the acute phase of infection has passed. With increase

missions were put into operation. By the end of 1928 all the infected regions of the Cameroons had been inspected and Jamot classified them as follows:

A.—*Epidemic zones* with an infection rate greater than 15 per cent. These included Nyong (46 per cent.) Deng Deng and Bertoua (40 per cent.) and Bertoua (28 per cent.) In these three foci no fewer than 82,583 persons were infected out of 194,889 examined (43.2 per cent.)

B.—*Endemo-epidemic zones* with an infection rate sometimes more and sometimes less than 15 per cent. These included Doumé Nanga, Eboko, Manguissas and Sanaga, Bafia and Sangmelima. Of the 160,306 persons examined, 23,319 (14.5 per cent.) were infected.

C.—*Endemic zones and zones in transition between contaminated regions and uninfected regions*. In these areas of 287,257 examined 8,883 (2.4 per cent.) were infected.

Before the creation of the prophylaxis missions, 64,012 patients had been discovered and of these 21,673 (34 per cent.) had died between 1920 and 1926. Among the patients treated the mortality was 5 to 15 per cent, whilst among the untreated Jamot concluded that it was 25 to 50 per cent.

The next portion of the report describes the influence of the operations of the missions on the evolution of the disease. The various zones are dealt with in detail one by one in a manner which it is impossible to deal with in a brief summary. Those interested must consult the original.

A chart is given showing the number of new cases discovered each year between 1920 and 1938. From this chart it is easy to see the striking success which followed the campaign introduced in 1927 and 1928 and which led to a fall in the total of new cases from 54,712 in 1928 to 6,000 in 1929. During the 10 years which followed the number of new cases has remained at about this level. The total result appears to be that chemotherapy enriched of late years by new products or new combinations cures most of the patients but does not suffice to cause the disease to disappear.

IV Yorks

MURAZ (G.) Exécution et résultats du nouveau programme anti-sommeilieux en A.O.F. et au Togo (du 1er Avril 1939 au 1er Janvier 1942). [The Results of a New Sleeping Sickness Programme in A.O.F. and Togo (from 1st April 1939 to 1st January 1942)] — *Presse Méd.* 1942, June 20, Vol. 50, No. 30, pp. 409-410.

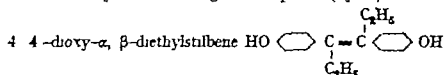
This article describes the changes in the sleeping sickness campaign made necessary by the war and by the armistice. Notwithstanding these however the work has continued actively as is shown by the figures set out in several tables. In 1938, for example, the number of people examined was about 1,291,000 whereas in 1940 it had increased to 2,675,000 and in 1941 to 4,414,000. The new infection rate had fallen during this period from 2.11 per cent. in 1938 to 1.08 in 1940 and 0.74 per cent. in 1941.

On 1st January 1942 the number of cases of sleeping sickness living in A.O.F. and in Togoland is stated to be 235,104. Of these 39,176 are possibly cured and under observation without treatment and 71,378 are considered to be definitely cured.

IV Yorks

LEIPERT (Th) & LOUCOPOULOS (L.) Zur Toxikologie der Stilbene
[On the Toxicology of Stilbene]—*Arch f Experim Path u*
Pharm 1941 Nov 1 Vol. 198. No 3 pp 299-304 With 1 fig
[20 refs.]

LOESER and GRUMBRECHT (1939) observed degenerative changes in the liver of experimental animals after subcutaneous and intramuscular injections of the synthetic oestrogenic compound (Cyren) —



These changes which consisted of the appearance of fine drops of fat in the liver cells and in the appearance of miliary and nodular liver cell necrosis were especially well seen within the first three weeks after small doses they disappeared later even after further administration of the compound and after higher doses so that apparently the animals had become habituated to the drug. The susceptibility of different animals decreases in the following order: cats, rats, mice, rabbits, guinea-pigs and dogs. Some later workers found fatty changes in the liver cells of injected animals and others failed to do so but nobody succeeded in confirming the necrotic changes described by Loeser and Grumbrecht. Secondary effects of stilbene therapy could not be ascribed to a toxic action of the drug on the liver but might be due to the oily solvent.

Since these findings were entirely based on histological examinations the authors asked themselves whether corroborative evidence could be obtained chemically through the estimation of the ether insoluble phenol of the urine by means of the Millon's reaction for the demonstration of liver damage. The normal organism excretes only traces of ether insoluble phenol which can be related to tyrosin. In necrotic degeneration of the liver cells there is an increased output of tyrosin so that in the severest cases (acute yellow atrophy) it appears as tufts of crystals. Such a urine is coloured deep red on warming with Millon's reagent. But this reaction is obviously unsuitable for the present investigation as the amount of tyrosin excreted as the result of minor liver damage due to stilbene must be small. The authors describe their modified technique for determining whether there is any excess of tyrosin in the urine of rabbits treated with stilbene. Details of the experiments are given, from which the authors conclude that they could find no support for the contention of Loeser and Grumbrecht that the administration of stilbene leads to organic and functional liver injury.

H. Yorke

DARMAN (Muhtar) Multiplication du *Trypanosoma cruzi* dans le sang périphérique de la souris par passages successifs. Recherche de la prémunition vis-à-vis des souches homologues et hétérologues. [Multiplication of *T. cruzi* in the Peripheral Blood by Successive Passages through Mice. Premunition against Homologous and Heterologous Strains]—*Ann Parasit Humains et Comparée* 1941 Vol. 18 Nos. 4-5-6 pp 166-179 With 5 graphs.

The author attempted to enhance the virulence in mice of two strains of *T. cruzi*. The first strain (Téhauntépéc) was brought from

Mexico by Brumpt in 1938 the second (Vickersae) was obtained from Mayer in Hamburg in 1935. An account is given of the technique employed.

It was found possible by successive passages through mice to produce an increase in the number of trypanosomes occurring in the peripheral blood. With the Tehuantepec parasite at the end of the 12th passage more than 40 trypanosomes per microscopic field were found, whilst with the Vickersae parasite this degree of blood infection was obtained after six passages. The virulence or pathogenic power of the parasite was not related to the number of flagellates in the peripheral blood; it depended upon the strain itself. An approximately equal degree of blood infection was obtained with each strain, but the Tehuantepec trypanosome produced a mortality of 10 per cent. of the infected mice, whereas the mortality produced by the Vickersae parasite was nil. Moreover the mortality produced by the Tehuantepec parasite was irregular and not parallel to the number of parasites in the peripheral blood.

Cross immunity experiments showed (1) that mice infected with the Tehuantepec strain exhibited a marked resistance against reinfection with the same strain four months later; (2) that the two strains were different; and (3) that mice reinfected after a month with the Vickersae strain exhibited a more or less marked resistance to this strain.

W. York

TORREALBA (J. F.) Xenodiagnoses de la maladie de Chagas à Zaraza (Guarico Venezuela). Vingt cas positifs sur soixante examens. [Xenodiagnoses in Chagas's Disease at Zaraza (Guarico Venezuela). Twenty Positive Cases in Sixty Examinations.]—*Ann. Parasit. Humaine et Comparée* 1941 Vol. 18 No. 4-5-6 pp. 154-165 [38 refs.]

The first xenodiagnoses undertaken by the author at Zaraza in 1933 gave five positive results in 20 cases; details are given. Since the publication of these results Torrealba has continued his work and summaries are given of 17 further positive results.

Discussing the subject of diagnosis in Chagas's disease the author states that as the value of the Machado reaction is debatable as the examination of thick films is of value only in new and recent cases and as blood inoculation fails, he concludes that Brumpt's xenodiagnosis is the method of choice. Torrealba usually employed *Rhodnius prolixus* for this purpose but sometimes *Eutritoma maculata*.

W. York

LEISHMANIASIS

COLE (A. C. E.) COSGROVE (P. C.) & ROBINSON (G.). A Preliminary Report of an Outbreak of Kala-Azar in a Battalion of King's African Rifles.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942, June 30 Vol. 36 No. 1 pp. 25-34

This paper describes an outbreak of kala-azar in a native battalion which had been operating in Kenya in the vicinity of the northern end of Lake Rudolph. There were in all thirty cases in the battalion and

one in an auxiliary unit. The clinical features of the disease are described in some detail and, as the cases were under observation in hospital from the commencement of illness these are of considerable interest. It is noted that in some respects the clinical and pathological findings are inconsistent with the usual description of kala azar. Leishmania were discovered in only 22 of the 31 cases and of these positive cases 14 proved fatal. An account is given of the post mortem findings. Treatment consisted of intravenous injections of tartar emetic the only antimonial available. Though in every case the temperature fell the fever usually returned in two or three weeks after the course had been completed. A second course would again bring down the temperature but the condition of the patient might have deteriorated to such an extent that the drug could no longer be tolerated. Though certain patients had been discharged from hospital the evidence of cure was not very convincing.

C M Wenyon

STEIN (L) & WERTHEIMER (E). A New Fraction of a Cold-Susceptible Protein in Blood of Dogs Infected with Kala Azar—*Ann Trop Med & Parasit* 1942 June 30 Vol. 36 Nos. 1 & 2 pp 17-27 [19 refs.]

The authors noted that serum taken from dogs suffering from kala azar contracted in Haifa Bay or the Plain of Esdraelon in Palestine formed a precipitate if it were kept at 5°C for some time. Investigation showed that precipitation actually occurred at any temperature below 37°C but the rate was proportionate to the lowness of the temperature and the concentration of a certain euglobulin fraction in the serum. The precipitate or at least most of it redissolved on raising the temperature to 37°C. This redissolvable fraction is termed the cold fraction (C.F). In addition there is a further euglobulin fraction which is precipitated when serum is diluted. This is called the dilution fraction (D.F). Another is precipitated by 11 per cent sodium sulphate. Some of the properties of these various fractions which are very labile are described in the paper. It is suggested that investigations with the aid of the ultracentrifuge and Tiselius apparatus will yield further information about the proteins of kala azar serum.

C M Wenyon

SATI (Mohammed Hamad). Antimony Treatment of Sudan Kala-Azar—*Ann Trop Med & Parasit* 1942 June 30 Vol. 36 Nos. 1 & 2 pp 1-8

The author states that during a period of five years he has treated 347 cases of kala azar in the Anglo-Egyptian Sudan with antimony in one form or another with a death rate of 20.7 per cent. Though he admits that the standard methods of treatment advocated by observers in India have proved inadequate for the disease as it exists in the Sudan he considers that reports of the failure of antimony treatment give too gloomy a picture. Basing his conclusions on a series of 150 cases which were admitted to the Singa Hospital he finds that a combination of drugs gives a better result than a single one. The drugs employed were tartar emetic and neostibosan, solustibosan and neostam. Of these tartar emetic appeared to be the most potent but it was the most toxic. A full course of neostibosan or solustibosan was followed after a week's interval by a course of tartar emetic and again a week later

simple type the dose employed was two exposures of 800 r with a half value layer of 0.022 mm. of aluminum, while for the chronic relapsing form it was 3 000 to 11 000 r with a half value layer of 0.02 mm. of aluminum. The paper is illustrated by a number of photographs showing the results of infra roentgen ray treatment and the good effects as regards subsequent scarring and pigmentation C M Weyon

KATZELLEBOGEN (1) Vaccination against Jericho Boil.—*Am Trop Med & Parasit* 1942 June 30 Vol. 36 Nos. 1 & 2 pp. 28-31

As oriental sore was becoming very common amongst workers of the Palestine Potash Plant on the Dead Sea where in one year 80 out of 120 new settlers had become infected, it was decided to try experimental inoculation on the thigh as a measure of prophylaxis. Accordingly 187 persons were inoculated intradermally either with flagellates from cultures or with leishmania from the spleens of previously infected hamster. In 130 a sore developed at the site of inoculation after incubation periods of less than a fortnight to two months. In most of the negative cases there was a history of a previous infection or of several years residence in the area. In five cases with signs of previous infection the inoculation was followed by an acute inflammatory reaction with tenderness of the inguinal glands and elevation of temperature to 39 C. In these no local lesion developed. In four other cases, however, which gave the inflammatory reaction without there being any history of an earlier infection, a sore developed. Three persons who had recovered from a previous infection gave no reaction. One who was known to have suffered from oriental sore five years before developed a sore at the site of inoculation on the thigh. Leishmania were found in the lesions of the early infection in 1939 and again in the later one in 1941. This case is the only one in which the authors have seen re-infection, in an experience of 17 years. During 1941 over 100 cases of oriental sore occurred amongst unvaccinated persons but none occurred amongst those who had received the prophylactic inoculation. C M Weyon

FEVERS OF THE TYPHUS GROUP

GEAR (James) & DAVIS (D H S) The Susceptibility of the South African Gerbil (*Genus *Tatera**) to Rickettsial Diseases and their Use in the Preparation of Anti-Typhus Vaccine.—*Trans. Roy Soc Trop Med & Hyg* 1942 June 30 Vol. 36 No. 1 pp. 1-7 With 2 figs on 1 plate

The two common gerbils of South Africa, *Tatera brants* and *T. afra*, were found to be susceptible to all the three forms of typhus fevers which occur in that country: 1. house-borne flea-borne and tick-borne typhus. After exposure of the animals to X-rays and intraperitoneal inoculation with the virus of each of these diseases profuse Rickettsial growth was found in the peritoneum. The source of the infecting

material was the brain of infected guinea-pigs except in the case of the tick borne disease in which it came from the peritoneal exudate of an infected white rat

Gerbils are claimed to be the animals of choice for obtaining large amounts of Rickettsiae in all three diseases. Similar inoculations in other animals have not been found capable of yielding such a rich supply. Gerbils do not breed readily in captivity but are obtainable in large numbers in South Africa where a systematic campaign of extermination is being carried out because the animals are the chief rodent reservoir of plague in that country. They are widely distributed throughout Africa and extend through Arabia and Asia Minor as far as India

John W D Megaw

OWCZAREWICZ (Leon) W sprawie epidemiologii duru plamistego w Polsce i Rosji [*Typhus Exanthematicus—Louse-borne Epidemic Typhus.*].—*Lekarz Wojskowy* (Jl *Polish Army Med Corps*) 1942. June-July Vol 34 No 4 pp 204-208 211-12 214-20 English summary pp 220-222.

This article appears in the fourth number of the 34th volume of the *Journal of the Polish Army Medical Corps* now published in England. The Corps is to be congratulated on this evidence of its vigour and enterprise.

The author served in the last war as epidemiologist with the Russian Army and so can discuss the epidemiology of the disease in the light of his own great experience.

The home of typhus is Eastern Poland, Russia, and the Balkans. A good example of the persistence of infection in places apparently free from the disease is given. A Russian regiment was billeted in peasant huts in East Poland during the last war and although no sign of the existence of typhus in the locality was detected, cases soon began to appear as many as a hundred fresh cases were admitted daily. Transfer of the regiment to barracks and delousing controlled the epidemic within a few days. Persons immunized to the disease by previous attacks can still play a part in spreading infection by transferring lice from infected persons. The original source of infection may be impossible of detection hence the suggestion has been made that rats infected with flea borne typhus may sometimes be responsible but although infected rats have been found in Poland the author doubts whether rats can serve as reservoirs of infection. Dust containing dried faeces of infected lice cannot play an important part during epidemics. The mildness of the disease in children is well shown by the statistics of Leningrad hospitals in 1918-19 the average case mortality was 9.2 per cent for all ages for children it was 0.6 per cent. The mortality is specially high in doctors and nurses and in brain workers. The relative immunity of motorized units is attributed to the use of petrol.

Effective delousing is very difficult in field conditions so that efforts have been made to prevent infestation by various means. Impregnating the clothing with cresol preparations only postpones infestation. Lice prefer light-coloured clothes and avoid dark ones hence the khaki colour of army clothes. Bags containing various drugs have been sewn into the clothes the Russians used a malinin solution consisting of a mixture of turpentine, an oil extract of Persian powder, phenol and cinnamon oil. This was quite effective against lice and

observed by the fourth day and animals killed on the sixth day had an abundant exudate in the tunica vaginalis containing numerous Rickettsiae. This exudate caused a severe pulmonary reaction in mice inoculated by the nasal route. After repeated intraperitoneal passage of this strain through guineapigs its virulence became attenuated and the scrotal reaction ceased to occur. The highly virulent exudate also became attenuated by prolonged storage in the dry condition or by prolonged refrigeration and then caused only the normal reaction in guineapigs. The virulence of suspensions could be approximately estimated by the intensity of the intradermal reaction in rabbits or by the severity of the reaction in inoculated guineapigs. Guinea pigs were vaccinated with formalized suspensions of the lungs of heavily infected mice. The resultant immunity was equal to that obtained by vaccination with a strain originating from infected lice. Vaccine was also prepared by the intranasal inoculation of rabbits with suspensions made from the lungs of infected mice. Formalized suspensions made from the consolidated lungs of the rabbits protected guineapigs, but only if the lungs were found to contain Rickettsiae.

The second part of the paper deals with the various morphological appearances observed in smears of infected material. The authors do not believe that the Rickettsial bodies pass through a true cycle of evolution. They regard the different forms assumed by the organism as being correlated with its degree of virulence and with the resistance of the infected animals. In smears of infected material they found the following forms: (1) Bacilliform Rickettsiae (2) Ruby red granular bodies of 1 to 5 μ in size made up of agglomerations of Rickettsiae (3) Ruby-red homogeneous bodies of 1 to 2 μ in size contained in the infected cells and analogous to the bodies seen after anticholera serum mixed with cholera vibrios has been injected into the peritoneal cavity of guineapigs (4) Rose-red inclusions and, (5) Red or blue minute granules of about $\frac{1}{2}\mu$ in size.

The bacilliform Rickettsiae are regarded as the only strongly virulent form. They are always found, together with the ruby-red and rose-red bodies, in highly infective material. In material of low virulence or in animals with high resisting powers bacilliform Rickettsiae are few or absent. Suspensions made from such materials have little or no immunizing power. Material free from bacilliform Rickettsiae is, however, capable of causing infection in susceptible animals, and after a number of passages the virulence of the virus is restored and Rickettsiae of the bacilliform type reappear.

Photomicrographs of these bodies and a photograph showing the various degrees of intradermal reaction in the rabbit add to the value of this important paper.

John W. D. Megaw

JACOB & DÖRSCHEL. Zur Differentialdiagnose des beginnenden Fleckfiebers [The Early Differential Diagnosis of Typhus Fever]. —*Muench Med Woch* 1942. June 5. Vol. 89. No. 23. pp. 507-509.

This paper is based on observations made on 108 proved cases of typhus fever seen in a hospital in the East.

The Weil-Felix reaction in titres of 1-200 and upwards was regarded as diagnostic. Positive results were nearly always obtained after five days, sometimes even after three days. The dry-blood agglutination test of HUDNICK and STEUER is regarded as being equal to the standard

test [see this *Bulletin* 1942 Vol. 39 pp 372-374] The incubation period rarely exceeded 12 days. Relative bradycardia with low blood pressure (95 to 105 mm. systolic) occurred in 75 per cent. of the cases within the first three days. In 70 per cent the skin eruption was preceded by a rash on the soft palate which closely resembled that seen in measles. Conjunctival injection was noticed in 75 per cent. There was meningismus in 25 per cent. On lumbar puncture the pressure was found to be only slightly raised the cell count was not increased and the albumen was very little more than normal. Bronchitis occurred in 80 per cent. of the cases. There was vasomotor paresis in 75 per cent within the first three days. The spleen was palpable in 75 per cent. Diarrhoea occurred in five cases all of which were exceptionally mild, in contrast with the cases in which there was constipation which were usually severe. True nephritis occurred in three cases.

The rash appeared suddenly between the third and the seventh days it was nearly always preceded by a mottling of the skin. Pale-blue spots were first noticed, these were never papular as in typhoid.

Differential diagnosis at the onset was often difficult especially from influenza, though a gradually rising leucocyte count was very suggestive of typhus. Lumbar puncture was often needed to differentiate the disease from cerebrospinal meningitis in the early stages. The other diseases from which early differential diagnosis was sometimes difficult were pneumonia typhoid fever measles epidemic encephalitis and trench fever. A few ambulatory cases were seen in one there was fever which lasted only four days.

John W D Megaw

DIETRICH (A.) *Fleckfieberdiagnose durch Untersuchung der Roseolen.* [Diagnosis of Typhus by Means of Histological Examination of the Rash Areas.]—*Munch Med Woch* 1942. May 1 Vol. 89 No 18. p 395

LIEBAU (Gerhart) *Einige Beobachtungen zur Klinik des Fleckfiebers* [A Report on Clinical Observations in Typhus Fever]—*Klin Woch* 1942 May 30 Vol. 21 No 22. pp 500-502

The most important feature of this paper is that it suggests the possibility of conveyance of infection through contact with infected blood smears. The name blood-smear infection is proposed.

In November 1941 no less than 23 healthy German soldiers were attacked with typhus fever they belonged to a squad of 25 men engaged in looking after typhus patients in a Russian prisoner-of-war camp near Berlin. The soldiers were treated in a military hospital in which the strictest precautions were observed these included preliminary delousing bathing and change of clothing. There were no further cases among the attendants on the soldiers with the remarkable exception of the medical officer in charge. In his case infection through the bites or infected faeces of lice could be excluded in the conditions prevailing in the hospital. The most obvious explanation of his infection was contact with blood smears of the patients from whom he took numerous specimens of blood and to whom he gave transfusions. To the best of the author's knowledge this is the first time that blood smear infection has been recognized.

Some of the clinical features of the 23 cases were as follows —

There were two deaths one from myocarditis and one from secondary staphylococcus infection. The incubation period was only five days in one case. The haemoglobin content of the blood was reduced by 35 to 40 per cent in most of the cases and full restoration took two to four months. Circulatory disturbances were observed in all but one of the cases and the risk of heart failure till a late period of convalescence is emphasized. In 11 cases there was partial deafness lasting three to four weeks. Sulphonamide drugs were without obvious effect except in cases of secondary infection such as bronchopneumonia in which sulphapyridine was useful. During the first week baths at 37° to 40°C were given once or twice daily for periods of a few minutes up to an hour. Adrenal cortical substances had no effect in cases with low systolic pressures. Subcutaneous injections of normal saline were helpful in cases of painful dryness of the throat, tongue and lips up to 1 000 cc. were given daily. Chloral hydrate in doses of one to three grammes was the best drug for relieving headache joint pains, restlessness and insomnia. Lumbar puncture also gave relief in such cases. For anaemia iron and campolon were given. A Weil-Felix titre of 1-200 or perhaps even 1-400 does not always establish the diagnosis of typhus fever a reaction in the latter titre was observed in a healthy attendant on the patients.

JOHN W D MCGREW

HUGHES (William) & BALDWIN (R B T) *Endemic Typhus in Southern Nigeria.*—*Trans Roy Soc Trop Med & Hyg* 1942. June 30 Vol 36 No 1 pp 35-39 With 2 charts.

Two cases of fever regarded as "endemic typhus probably sea borne" are described as occurring in Lagos. The duration of the fever was about 21 days in one case and about 17 days in the other.

The maximum titres of the agglutination tests in one case were *Proteus* OX19 1-1,280 (trace) *Pr* OX2 1-160 and *Pr* OXK 1-40 all on the 23rd day in the other case they were *Pr* OX19 1-1,280 *Pr* OX2 1-160 and *Pr* OXK 1-80 all on the 10th day. No rash was seen but the patients were very dark-skinned. There was a close clinical resemblance between these cases and some cases of urban typhus seen by one of the authors in Malaya. The place of origin of the disease the absence of a primary eschar and the high X19 agglutination suggested a flea-borne or louse-borne infection rather than a tick-borne or mite-borne disease and the authors state that the cases described leave little doubt that endemic typhus exists in Nigeria.

Reference is made in the paper to previously recorded cases from North Nigeria which are regarded as being of the same type. (a) Two similar cases in Europeans in which a positive Weil-Felix reaction occurred during or after attacks of fever of 14 days duration with a maculo-papular rash these were reported by J NAUDI and T H DAVEY in 1938. (b) Eighteen cases of a twelve days fever of the dengue group reported by L V DAVIES and W B JOHNSON in 1921. Fifteen of these cases were in Europeans and three in Africans the fever lasted 10 to 13 days falling by lysis, and there was a maculo-papular rash. The present authors point out that the features of this group of cases suggest typhus fever rather than dengue.

[The reference to the cases reported by Davies and Johnson is of special interest to the reviewer who in the *Indian Medical Gazette* of October 1921 commented on them in a note written as a supplement to the article in which he first suggested that the various typhus-like fevers should be regarded as fevers of the typhus group and should be classified provisionally as louse typhus tick typhus and mite typhus. In this note it was pointed out that the Nigerian cases resembled the Indian tick typhus rather than dengue. At that time the existence of flea borne typhus was not known and although on the evidence the cases described in the present paper seem likely to be flea-borne the possibility that they and the other fevers referred to by the authors may have been tick-borne has not been excluded.]

John W D Megaw

NEITZ (W O) ALEXANDER (R. A.) & MASON (J H) *The Transmission of Tick-Bite Fever by the Dog Tick *Rhipicephalus sanguineus* Labr—Onderstepoort Jl Vet Sci & Animal Industry* 1941 Jan & Apr Vol 16 Nos. 1 & 2. pp 9-17 [13 refs]

The virus of tick bite fever [tick-borne typhus] has been transmitted by *R. sanguineus* from guineapig to guineapig. Larvae bred from infected ticks have also been shown to be able to transmit infection to guineapigs by their bites.

The authors state that as has already been shown by two of them [Mason and Alexander this *Bulletin* 1941 Vol. 38 p 203] very little experimental work has been done to identify the vectors of tick-bite fever. Most of the evidence has been either circumstantial or has been based on the effects of the intraperitoneal injection of emulsified ticks into guineapigs: such experiments do not prove that the ticks are natural transmitters of infection.

The authors in 1939 isolated a strain of *Rickettsia* by feeding nymphs of *Hyalomma argyphum* collected from a hare on a guineapig: the larvae and adult ticks of the next generation were not infective. GEAR and DE MEILLON in 1939 [this *Bulletin* 1940 Vol. 37 p 263] established a strain of *Rickettsia* in *Haemaphysalis leachi* found on a dog belonging to a patient suffering from tick bite fever. No other positive results are known in tick feeding experiments.

The strain of *Rickettsia* used in the present experiments was maintained with difficulty in guineapigs by brain to peritoneum passage but rich egg membrane cultures inoculated into animals by the intraperitoneal route caused pronounced reactions. Clean larval nymphal and adult *R. sanguineus* were fed on reacting guineapigs and afterwards used to infect other guineapigs by biting. Positive transmission was proved by the demonstration of *Rickettsiae* in smears from the tunica vaginalis and the production of a pronounced reaction on passage or the development of solid immunity in the inoculated guineapig.

With *R. sanguineus* the following results were obtained: (1) Larvae which had fed on two reacting guineapigs transmitted the infection when fed as nymphs on susceptible guineapigs. (2) Nymph ticks picked up infection which was afterwards transmitted to guineapigs by the ticks when they had grown to the adult stage. (3) Larvae hatched from eggs laid by the infected adults were shown to be infective.

John W D Megaw

JACOB (J.) Neue Beobachtungen ueber Fünftagefieber mit besonderer Berücksichtigung der Differentialdiagnose und Therapie. [New Observations on Five-Day Fever (Trench-Fever) with Special Reference to Differential Diagnosis and Treatment.]—*Wsch. Med. Woch.* 1942. July 10 Vol. 89 No. 28 pp. 815-818.

This paper deserves close attention. It shows that trench fever given suitable conditions, can again become a very important war disease. To the younger generation of medical men trench fever is history but its potentialities can be judged from the fact that about half a million cases occurred among the fighting armies in the 1914-18 war and from the estimate that the fighting strength of the allied armies suffered to the extent of eight million man-power days.

Trench fever is caused by *Rickettsia quintana* which is conveyed from man to man by lice. The organism takes four or five days to develop in the vector. The onset is sudden with chill headache pains in the muscles and bones, especially in the shin bones. The fever is of a relapsing type the spells of fever Three types of fever are recognized: (1) Paroxysms of fever lasting one or two days and recurring at intervals of four to six days. The intermissions usually last about five days. The onset of the successive spells of fever may be anticipated or postponed in the same way as in malaria. There may be anything up to several dozens of paroxysms of fever recurring with a periodicity of four to ten days.

(2) The fever may simulate typhoid. (3) Rarely the fever may simulate typhoid. The author saw 71 undoubted cases between January and March, 1942 in a "hospital in the East. The diagnosis was made only in cases with relapses of the five-day type or with spontaneously mentioned shin bone pains. There must have been a considerable number of unrecognized cases because of there being no laboratory test for the disease.

Of the 71 cases 53 had typical shin-bone pains. These also occur in relapsing fever, typhus, and the later stages of trench nephritis. There were pains in other parts of the body, especially the knee- and ankle-joints, in 68 cases. The shin bone pains started during the first spell of fever in 28 cases during the second in 15 and during the third in 11. The pains were worse during the febrile periods in 29 cases, unaffected by the fever in 26 and less during the fever in three. The fever was paroxysmal in 24 cases undulating in 34 alternately paroxysmal and undulating in nine and typhoid like in four. The spleen was always enlarged, the leucocyte count was 10 000-14 000 during the paroxysms but normal during the intermissions. In six cases a maculo-papular rash was seen during a febrile period. In one of these cases it appeared on two occasions. In 22 cases the disease occurred as a complication of epidemic hepatitis (acute infective hepatitis caused probably by a filterable virus) of which no less than 450 cases had been seen by the author up to the time of writing. The complications were: acute catarrh of the throat (6) nephritis (8) cystitis (2) pneumonia (1) gastric or intestinal catarrh (4) bronchitis (2) influenza (3). There were no deaths, indeed there is no record of fatality ever having occurred in uncomplicated cases of the disease. Pyrimidon was given to 48 patients in daily doses of 1.2 to 3.0 grammes only, none of the patients failed to get decided relief from the pains, but though the drug often seemed to control the fever no

claim is made that it had any curative action. In view of the claim made by MAGERL that four cases of trench fever had been cured by intravenous injections of sulphapyridine this drug was tried in 10 undoubted cases. In four it was given by the vein and in six by the mouth. No benefit was observed. On the contrary headache lassitude and vomiting often resulted to such a degree that the drug had to be discontinued.

Differential diagnosis from undulant fever of the *abortus* type may sometimes be impossible without agglutination tests. From typhoid fever in inoculated persons it may have to rest on the leucocytosis and shin bone pains because the type of the fever curve and the laboratory tests sometimes fail to provide evidence on which the diseases can be distinguished from each other.

[This is the first and so far the only report of a large-scale outbreak of trench fever since 1918. The clinical account of the disease is admittedly incomplete. A number of atypical cases must have been missed because of the lack of a specific laboratory test. Yolk-sac cultures of the *Rickettsiae* may possibly supply suspensions by which agglutination reactions can be carried out.]

The author (presumably for military reasons) has maintained complete silence about the epidemiological conditions in which the outbreak occurred but there is some significance in his statement that he has seen 450 cases of infective hepatitis and 128 of trench nephritis up to the time of writing.

The failure of sulphapyridine in treatment is an important observation. MAGERL's claim to have cured four cases of trench fever by this drug has already been criticized by the reviewer (see this *Bulletin* 1942 Vol 39 p 154). The author is equally critical of Magerl's diagnosis and the absence of response to sulphapyridine in a number of undoubted cases of trench fever seems to prove that the non-malarial quartan fever must have been a different disease. PRIEST (above p 738) has just published a note on a case of Meningococcal Septicaemia Resembling Malaria which was strikingly similar in all respects to the case described in detail by Magerl. The response to sulphapyridine was equally prompt in both cases. Priest was unable to recover meningococci from the blood but his diagnosis has received anticipatory support which is worth recording. This was contained in a personal communication conveyed to the reviewer some weeks before the appearance of Priest's note. In this D. G. ARDLEY suggested that Magerl's cases might have been meningococcal septicaemia. Whatever this disease may prove to be one point has been clearly established: there is a non-malarial fever with quartan periodicity which yields promptly to sulphapyridine. For other recent records of disease diagnosed as Trench fever see this *Bulletin* 1942 Vol 39 p 386.]

John B. D. Megaw

YELLOW FEVER.

MAHAFFY (A. F.) SMITHBURN (K. C.) JACOBS (H. R.) & GILLET (J. D.) Yellow Fever in Western Uganda.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942 June 30 Vol 36 No 1 pp 9-20. With 1 map.

Studies of the distribution of yellow fever immunity in Western Uganda based on investigations extending over 4 years from 1937 to 1941.

These have revealed an important focus of the disease in that part of the Semliki river west of the Ruwenzori Mountains. In Bundibugyo in 1937 the blood of 25 out of 54 adult residents was found to give a positive protection test. The results of earlier tests showed that throughout the area the highest percentage of immune individuals was found in villages along the edge of an uninhabited heavy forest between Hakitengya and Butoga.

A group of 275 individuals from the Bwamba area had been shown to be non-immune in October 1939 or in January 1940 some of these were re-examined and out of 97 tested in April and 71 in June, 1941 48 had become positive. Further studies resulted in two cases being seen in which a clinical diagnosis of yellow fever seemed justified and a strain of virus was isolated from one of them, an African female, aged 27 years.

In addition two strains were isolated from wild-caught mosquitoes, *Aedes simpsoni*. This is by far the most prevalent mosquito and comprised 97 per cent of all mosquitoes captured. It breeds chiefly in plant axils, and although not found inside houses, occurs in their vicinity. *Aedes argyph* is very rare and all the available evidence indicates that this outbreak in Bwamba is associated with contact with the forest.

E Hindle

BABLEY (J) La recherche du test de protection de la souris et l'examen histologique du foye envisagés comme indicateurs dans l'épidémiologie de la fièvre jaune. A Study of the Mouse Protection Test and the Histological Examination of the Liver Considered as Indicators in Yellow Fever Epidemiology. — *Ann Inst Pasteur* 1941 Apr Vol 66 No 4 pp 320-328 With 1 fig (map)

A record of 10 cases of suspected yellow fever in French Equatorial Africa occurring during the period 1937 to January 1939 compared with the results of mouse protection tests in the areas in which they occurred.

Four cases occurred at Port-Gentil and Libreville on the Gabon Coast, and one at Brazzaville all places connected by rail which could bring carriers from the ports of Dahomey, Ivory Coast and Nigeria. The virus was isolated from the Brazzaville case by inoculation of the blood into susceptible animals. Serological tests in native villages adjoining these towns gave more than 20 per cent. positive and it is evident that yellow fever is endemic in these regions.

Two cases occurred at Bangui and one at Mobaye in the region of the Oubangui-Chari and one at Berberati on the Upper Sangha, where very high percentages of positive mouse protection tests were obtained in 1931-33. This region would seem to be infected with the jungle form of yellow fever with weak powers of diffusion and the existence of the disease has only been confirmed by systematic viscerotomy in all suspected cases which ended fatally.

Finally, two cases of yellow fever typical both clinically and histologically have been found near the opening of the Chari into Lake Chad in a region previously considered free from the disease. However positive protection tests ranging up to 50 per cent. have been found in this region, and it is suggested that virus may have been imported from Nigeria, where numerous cases have been recorded, and which lies in close proximity to the Chad area.

E Hindle

FINDLAY (G M) The Localization of the Neurotropic Strain of Yellow Fever Virus in the Central Nervous System.—*Trans Roy Soc Trop Med & Hyg* 1942 June 30 Vol 36 No 1 pp 21-24

The application of Sandler's technique for the localization of virus in the central nervous system by means of insulin hypoglycaemia, to the infection of mice with yellow fever virus

Six adult mice were starved for 24 hours then given 0.8 unit of insulin per kgm of body weight subcutaneously followed two hours later by an intraperitoneal injection of 0.2 cc. of a 20 per cent. suspension of the brain of a mouse infected with yellow fever. Five of these six mice developed encephalitis

Further experiments resulted in 32 out of 42 mice being infected in this manner. The effect was shown to be the result of insulin shock and not of any direct toxic action of the insulin. It is suggested that deficiency of oxygen following insulin shock might damage the blood brain barrier and allow the seepage of virus into the central nervous system. In confirmation of this hypothesis it was found that when adult mice were treated with coal gas which also produces oxygen deficiency they could be infected with neurotropic yellow fever virus administered intraperitoneally

E Hindle

PELTIER (M) DURIEUX (C) JONCHÈRE (H) & ARQUIÉ (E) Vaccination mixte contre la fièvre jaune et la variole sur des populations indigènes du Sénégal. [*Mixed Vaccination against Yellow Fever and Smallpox in the Native Population of Senegal.*]—*Ann Inst Pasteur* 1940 Sept Vol. 65 No 3 pp 146-169

A more detailed account of the results of mixed vaccination against yellow fever and smallpox. [See this *Bulletin* 1940 Vol. 37 p 92]

The authors have applied this method of vaccination by cutaneous scarification of a mixture of neurotropic yellow fever virus and vaccinia to 88,873 natives in Senegal. The inoculations have been well borne even by infants and no serious after-effects have been reported and in particular no case of yellow fever has been observed.

The results of vaccination were very carefully controlled and in each district several specimens of blood collected from school-children were previously examined in order to determine the serum protection rate. This was followed by mixed vaccination of the school-children and general population, the vaccinia vaccination being checked 8 to 10 days later. Finally two specimens of blood were collected from each subject after an interval of about two months in order to control the anti yellow fever vaccination.

The results are given in tabular form each district being recorded separately. The vaccinia produced the same percentage of successes as when used alone. The yellow fever virus gave a proportion of 95 per cent. positive serum protection tests and the immunity lasted for at least a year.

In order to obtain the best results the authors consider it essential to observe the following precautions—

- (1) Practise the vaccinations outside the hot season which lasts from March to June
- (2) Place the vaccination subjects as soon as possible in the shade for at least 10 minutes after vaccination.

- (3) Preserve the yellow fever vaccine on ice until the moment it is used.
- (4) Use a vaccinal strain resistant to high temperatures, or keep it protected from heat and light

The authors insist on the advantages of this new method, especially its harmlessness, simplicity and rapidity of execution, and point out that native populations submit much more readily to inoculation by cutaneous scarification than to hypodermic injections. The method has been so successful in Senegal, that it is proposed to extend its use to the populations of the Ivory Coast and French Sudan, and ultimately to other French African Colonies.

E. Hinde

SULZBERGER (Marion B.) & ASHER (C.) Urticarial and Erythema Multiforme-like Eruptions following Injections of Yellow Fever Vaccine.—*U S Nav Med Bull* 1942 Apr Vol. 40 No 2. pp 411-414

A description of three cases of skin reactions following injection with yellow fever vaccine. These patients came from different ships and had received injections of different lots of vaccine. The eruptions were of the urticarial and multiform type and were characteristic of mild serum disease and of other mild forms of sensitization to foreign biological agents.

This form of allergic cutaneous reaction after injection with yellow fever vaccine does not seem to have been previously recorded.

E. Hinde

PLAGUE

PUBLIC HEALTH REPORTS 1942 June 12 Vol 57 No 24 pp. 903-905.—Plague Infection Reported in the United States during 1941 in Human Beings.

Two fatal human cases of plague occurred in the United States during 1941 both in Siskiyou County California in each case the source was believed to be ground squirrels. Plague infection has been found in rats or rodents in eight Western States as far east as North Dakota a complete list of plague infection in wild rodents or their ectoparasites reported in 1941 is given.

C. IV

PARDAL (Eduardo) Peste en Cañada Grande (Provincia de Cordoba) y en otros lugares de la Provincia de San Luis. [Plague in Cañada Grande (Province of Cordoba) and in the Province of San Luis, Argentina].—*Bol Sanitario* Buenos Aires. 1941 Apr-Dec. Vol 5 Nos 4-12 pp 335-358 With 2 maps

The area in which the plague epidemic arose contained some 40 habitations within 10 square kilometres and about 250 inhabitants, mostly occupied with rearing goats, sheep and cattle. The interest of the epidemic, involving 11 cases lies in its origin and its high degree of infectiousness. A certain amount of evidence is available that the first patient contracted the disease from her cat which died a few days before her own illness and which had probably been infected by field rodents. The patient developed bubonic plague septicaemia and

secondary pneumonia. From her the disease spread to relations and from these individually to their relations or to attendants. It became pneumonic. It was not till the third case that the diagnosis was established clinically and bacteriologically. In the investigation which followed it was not found possible to obtain proof of the presence of dead rats. Proof of infection of field rodents and of the existence of an epizootic was forthcoming and consequently this epidemic is characterized as one arising by sylvatic infection. The other cases mentioned and described in the article are single cases which occurred elsewhere in other years.

W F Harvey

D AMATO (Hugo J) Profilaxia de la peste en la República Argentina. [Control of Plague in Argentina.]—*Bol Oficina Sanitaria Panamericana* 1942 July Vol 21 No 7 pp 656-657
English summary

During 1940 there were 138 cases of plague in northern Argentina (provinces of Jujuy, Salta, Tucumán, Santiago del Estero and Rioja) with a mortality rate of 64%. The virus has been spread by wild rodents (*Graomys*, *Hesperomys*, *Cavia*, *Microcavia* and *Galea*) and most human cases had been in direct contact with them. Characteristics of this epidemic were intensive human repercussion and frequency of contamination of domestic rats. Control work was carried out by travelling brigades which took charge of destroying domestic and semidomestic rodents and left additional poison. They visited 13,579 houses, dealt with 20,909 burrows and distributed 254,202 packets of arsenic. In 1937 there were only 10 deaths from plague in the whole country and only 8 in 1938.

PUBLIC HEALTH REPORTS 1942 May 8 Vol. 57 No 19 pp 716-717—Live Mouse found on Airplane at Miami Quarantine Station.

The mouse was found in the galley of the aeroplane on arrival at Miami from Porto Rico. It is pointed out that with the increased use of transport aeroplanes and the carriage of foodstuffs, the opportunities for rats to board, nest in and be transported by aeroplanes are increasing. An infected rat may transmit plague to crew or passengers or may start a focus at some calling point on the journey. The finding of this mouse indicates that there is need for greater vigilance on the part of aeroplane companies and quarantine officers to prevent the transport of rats.

C IV

GIRARD (G) Caractères essentiels des souches de bacilles pesteux susceptibles d'être utilement employés comme vaccins vivants. [Essential Characters in Strains of Plague for Use as Living Vaccines.]—*Ann Inst Pasteur* 1941 Nov Vol 67 No 5 pp 365-367

Not every avirulent strain of plague bacillus will make an efficacious living vaccine. Three characters are essential—(1) Normal growth especially in broth. Non-antigenic avirulent cultures grow badly in clumps which deposit and they tend towards an R type. (2) Persistence of a certain degree of virulence. A nodule should develop at the seat of injection in the guinea-pig with a dose of 1,000 to 2,000 million

bacilli and disappear by the 12th day. Some splenic reaction is to be expected. (3) Persistence of a certain toxic power. Extracts obtained by freezing and thawing agar cultures according to the technique of GORY and GRASSET and filtering through a bacterial candle should cause the death of a mouse in eight to 36 hours with subcutaneous doses of 1/20 to 1/4 cc. W F Harvey

CHOLERA

Griffitts (James J.) The Use of Mucin in Experimental Infections of Mice with *Vibrio cholerae*—*Public Health Rep* 1942 May 8 Vol 57 No 19 pp 707-710

A 5 per cent suspension of granular mucin in distilled water with pH 7.2-7.4 is used. It is strained through four thicknesses of gauze sterilized and then kept at 5 C. The injection of several hundred million living vibrios in saline intraperitoneally is required to produce death in mice within 18 hours and to give a culture from the heart blood. Suspended in mucin instead of saline a few thousand living and recently isolated cholera vibrios will kill in 16 to 18 hours and cultures may be obtained from the heart blood in 4 to 6 hours. By this method the injection of as few as 5,000 organisms kills approximately 80 per cent of the mice within 72 hours, whereas a dose of 50 million organisms in saline is not fatal to mice. W F Harvey

Griffitts (James J.) Laboratory Studies of the Effect of Sulfonamide Drugs on *V. cholerae*—*Public Health Rep* 1942 May 29 Vol. 57 No 22 pp 814-818

The trials of the value of sulphonamides in cholera which have so far been undertaken, have not proved satisfactory. It is contended that experimental workers have made use of test doses of the vibrios which are much too large such as 875,000,000 organisms intraperitoneally in mice. In his *in vitro* experimentation Griffitts uses only 5,000 living cholera vibrios added to 5 cc broth containing various amounts of drug. Sulfanilamide, sulfathiazole and sulfadiazine inhibited the growth of this organism whereas sulfaguanidine and succinyl sulfathiazole did not. Sulphathiazole in 1-8,000 dilution inhibited growth for 24 hours, and 1-1,000 for more than seven days. The inhibitory action of sulphadiazine and sulphanilamide in 1-1,000 dilution was effective for five days and two days respectively. The *in vivo* experiments were carried out by suspending vibrios of Inaba and Ogawa strains in 5 per cent mucin and injecting five-week old mice of 12 to 14 gm weight intraperitoneally. In a control series 70 per cent of mice should die with a dose of 50,000 vibrios and 80 to 100 per cent with a dose of 500,000. Mice were given approximately 500,000 living vibrios in mucin by intraperitoneal injection as the challenge dose. Of those given a single injection of sulfathiazole or sulfadiazine 80 to 90 per cent survived for 24 hours and 50 per cent survived the 7-day test period. The drug was given one-half to one hour after the infecting dose. It was found that succinyl sulphathiazole and sulphaguanidine as well as sulphathiazole protected when the drug was given intragastrically. W F Harvey

AMOEBIASIS

SAWITZ (W G) & FAUST (E C) The Probability of detecting Intestinal Protozoa by Successive Stool Examinations.—*Amer J Trop Med* 1942 Mar Vol 22 No 2. pp 131-136 With 2 figs [10 refs]

With a view to estimating the accuracy of single examinations for intestinal protozoa six normally passed stool specimens from 118 children in a home in New Orleans were examined by two direct methods (iodine and haematoxylin stained films) and by zinc sulphate concentration technique. The results when analysed showed that the efficiency of the examination of a single film for the detection of *Entamoeba histolytica* infections was less than one in five and ten examinations had to be made for a negative result to be reasonably reliable. By a combination of one of these techniques with zinc sulphate centrifugal floatation about one out of three or four infections was detected in a single examination, and 70 to 90 per cent of infections in five examinations. The efficiency of film examination for non pathogenic protozoa was greater than for the pathogenic *E. histolytica* for one examination detected one out of four infections while five examinations detected about 80 per cent. If the examination of a single film was combined with centrifugal floatation one out of two infections was detected. The examination of three film specimens combined with centrifugal floatation disclosed over 80 per cent of infections. The general conclusion is that the use of the zinc sulphate centrifugal floatation technique in combination with the direct film examination provides greater reliability and ease of detecting intestinal protozoa with fewer specimens than either of the non-concentration techniques

C M Wenyon

CHINN (Ben D) JACOBS (Leon) REARDON (Lucy V) & REES (C W) The Influence of the Bacterial Flora on the Cultivation of *Entamoeba histolytica*.—*Amer J Trop Med* 1942 Mar Vol. 22. No 2. pp 137-146

The investigations on *Entamoeba histolytica* described in this paper are a continuation of those detailed in a paper by REES REARDON JACOBS and JONES [this *Bulletin* 1942 Vol. 39 p 28]. The medium used was a modified Boeck and Drbohlav medium consisting of whole egg slants with an overlay of Locke's solution. Rice starch is added and sheep serum also if further enrichment is required. Sterile cysts, obtained by the micro-isolation method of the above-named workers were used for inoculation of the medium. The effect on excystation growth and encystation of 26 species of bacteria and three yeasts all of which were shown to grow in the medium was tested. It was found that certain bacteria produce conditions in the medium which stimulate excystation and hydrolyse the proteins and carbohydrates to products essential for multiplication. On the other hand other bacteria are incapable of stimulating excystation though they are able to provide conditions necessary for growth after excystation has occurred. The amount of growth varies however with the organism used and it has been found that a poorly growing culture may be greatly stimulated by the addition of a second bacterium. When the subject of encystation was investigated it was found that cyst formation

concentrations. Ascaridol was very toxic to Enchytraeids and to living *Ascaris lumbricoides* but had only a slight action on the muscle and nerve-muscle preparations. Whole leeches and earthworms were less sensitive to it. Most of the other drugs were less toxic to *Ascaris lumbricoides* than to the Enchytraeids.

Earthworm muscle preparations without nerve responded more readily than leech muscle without nerve. Living whole earthworms suffered more from the drugs than did whole living leeches. Substances acting strongly on Enchytraeids and on *Ascaris lumbricoides* were also very toxic to whole leeches and earthworms.

The authors think that substances that are markedly toxic *in vitro* to living worms can be used as worm remedies, even if they are like ascaridol not so active against muscle and nerve-muscle preparations of the leech and earthworm. It is more difficult however to judge the value of substances that are active against the muscle and nerve-muscle preparations but not against the living worms. The value of santonin as an anthelmintic seem they think to have been over estimated. Oil of chenopodium and ascaridol are better. Possibly santonin acts as a vermifuge stimulating the muscle and nervous system of the worms. Infusions of *Digenea simplex* the active principle of helminal (Merck) may prove for similar reasons to be a good anthelmintic. Santonin may be as KOKAME and ASADA suggested, active only after it has formed some kind of combination with the helminth tissues.

When the same drugs were given orally to white mice, most of them were more toxic in watery than in oily emulsions, but only if they were first very finely powdered. The toxic doses of some of them are given in terms of mouse weight. Ascaridol, beta-naphthol, hexyl-resorcinol, santonin, chlorcarvacrol and filmaron were the most toxic. Carbon tetrachloride, tetrachlorethylene and chloroform had about the same toxicity. Rotenone was highly toxic although it is practically insoluble in water and with difficulty in fats. Helminal was not toxic to mice.

To isolated frog's heart filmaron alone was toxic in low concentrations. 1-2 mgm per cent almost immediately stopped the heart beat and perfusion with fresh Ringer did not restore it. Perfusion of 0.1-1 mgm per cent of adrenalin did restore its normal action after it had been slowed by 0.4-0.5 mgm per cent of filmaron.

The details of the results will interest research workers but the muscle of nematodes and probably also that of cestodes and trematodes is so different from that of annelids that direct study of the action of possible helminth remedies on the muscle and nerve of helminths themselves should give more valuable results. Such a study is now in progress in England.

G. Lapege.

BATGE (R.) Sur un foyer de bilharziose vésicale dans le Sud Tunisien [On a Focus of Vesical Bilharzia in South Tunisia].—*Arch Inst Pasteur de Tunis* 1941 Dec Vol. 30 No 3-4 pp 291-301

There has been no change in the geographical distribution of bilharzia in the El Oudiane region since CAROULLARD and GOBERT described it in 1908. In the Djerid the disease is localized entirely in El Oudiane (excepting very rare cases from Tozeur and Nefta) and especially in the villages of Zaouet el Arab, Zergane and Ouled Majed. The heaviest incidence was found in Ouled Majed where all the people are poor and all are gardeners in contact with the infestation from infancy.

Bilharzia in El Oudiane May-June 1941

Locality	Adults						Children up to 15					
	Males			Females			Males			Females		
	No	Pos.	%	No	Pos.	%	No	Pos.	%	No	Pos.	%
Zaouiet El Arab	46	22	47.8	6	0	0	40	17	42.5	9	0	0
Zorgane	9	6	66.6	5	1	20	9	6	66.6	7	3	42.8
Ouled Majed	65	56	86.1	40	22	55	30	24	80	22	16	72.7

The snails live as Gobert showed mostly in the Ain Hamadi the Ain Tafrina and the Ain Karmous. The local people know well that immersion in these is often followed by skin irritation sometimes erythema and some months later blood in the urine. The Ain Tafrina is used as a source of drinking water and women do their washing in it this is dangerous because 10 minutes in water will soften the skin sufficiently to allow cercariae to pass through it. The snail *Melanopsis* is found everywhere and 40 per cent of those in the Ain Tafrina harbour *Cercaria vivax* although the author noted one or two cercariae of *Schistosoma* also in them. Of the snails in the Ain Tafrina 10 per cent. harbour cercariae of *Schistosoma* but these cercariae are found in only 2 per cent of the snails in the Ain Hamadi and the Ain Karmous. For the destruction of the snails copper sulphate was excellent although it may render the water unfit for consumption for a while. Ducks are also useful but in such wide areas unsupervised ducks are liable to be taken by unscrupulous people.

Anthiomaline was given to 15 persons from Ouled Majed infested with *Schistosoma haematobium*. Their ages were 14-30 years except two aged 50 and all had suffered for 2-10 years. There were no ill effects except slight vertigo in one case and all continued with their work during treatment. Examinations of the urine the day after each injection showed that after the sixth injection dead (black) eggs appeared in the urine. The injections were given every two days commencing with 1 cc. and continuing with 2 cc. 3 cc and 4 cc. thereafter the dose of 4 cc. was repeated except when one of 2 cc. was substituted. The case records show that dead eggs appeared in five cases after 14 cc. in six cases after 18 cc. in two cases after 16 cc. in one case after 23 cc. and in one case after 22 cc. Cure was regarded as complete when no eggs were seen in centrifuged urine the general condition of the patient then improved.

G Lapage

PENNER (Lawrence R.) Studies on Dermatitis-producing Schistosomes in Eastern Massachusetts with Emphasis on the Status of *Schistosomatum pathlocopticum* Tanabe, 1923 — *Jl Parasitology* 1942. Apr Vol 28 No 2 pp 103-116 [18 refs.]

The author studied five of Tanabe's preparations of *Schistosomatum pathlocopticum* a new genus and species erected by Tanabe for worms developing from cercariae found in *Stagnicola palustris* and put experimentally into white mice and white rats. Penner shows that *S. pathlocopticum* is a synonym of *Schistosomatum douthitti* (Cort 1914) the natural host of which is so PRICE believes the field mouse its cercariae can produce water itch or schistosome dermatitis.

Penner could not find schistosome cercariae in 2,781 specimens of *Stagnicola palustris* either in areas where Tanabe collected (from some of which areas this species of snail seems to have disappeared) or in other areas. Extensive collection of large numbers of freshwater gastropods belonging to ten different genera in ten arbitrarily designated areas in Eastern Massachusetts including waterways, lakes and ponds where there could be swimming and wading failed to reveal any schistosome infestation, excepting in one *Physella heterostropha* which had an immature infestation not of the *Schistosomium* type—it was similar to *Cercariae physellae* and other related species known to cause dermatitis. There is no water itch problem in the areas examined at present and no substantial evidence that there may be one in the future. Marine gastropods were not examined—possibly some beaches and bays may have snails carrying enough cercariae to produce a dermatitis problem.

In many areas the abundance of the snails that could be intermediate hosts has been reduced or they have been eradicated by covering streams with oil for mosquito control by their pollution by sewage, etc. by converting lakes and ponds into reservoirs and consequent reduction of the water weeds which feed the snails, by making artificial covered channels for streams and by docks and rats. In other areas where the snails exist the definitive hosts seem to have disappeared (the only recognized definitive host of *S. doukhiti* found was the brown rat in which Price showed that its development cannot be completed). Where both definitive and intermediate hosts exist there is a minimum of swimming and wading. *G. LaPage.*

NAËR (Mahmoud). The Occurrence of *Prokermistomum rixax* (Bonsino 1892) Azim, 1933. Infection in Man, with a Redescription of the Parasite. Reprinted from *Laboratory & Med Progress*. 1941 Nov Vol 2 No 2 pp 135-149 With 5 figs. [33 refs.]

One man, aged 30 a fez seller and a resident of Cairo was admitted to hospital for bilateral pulmonary tuberculosis—he died and five specimens of the Strigeid trematode *Prokermistomum rixax* were recovered from his small intestine. Dead eggs of *Schistosoma haematobium* and evidence of bilharzial cystitis were also found.

The anatomy of *Prokermistomum rixax* is described in detail with a schematic drawing of it and comparative measurements of its various organs. This small, spoon-shaped trematode was discovered by Loose in the small intestine of the Egyptian kite—it was described by Odhner who named it *Prokermistomum spinulosum*. Azim obtained *Cercaria rixax* from the gastropod snail *Cleopatra bulimoides* and placed them in the same water as the fishes *Gambusia affinis* and *Tilapia nilotica* (the common Bolls of the Nile). Later he found metacercariae in these fishes allowed dogs and cats to eat their raw flesh and obtained adult flukes from the small intestines of the dogs and cats. These he considered to be identical with *Prokermistomum spinulosum* but he renamed the species *P. rixax* because the larval name *rixax* given to the cercaria by Bonsino had priority. Lutz and Szidat doubted this diagnosis but Naër concludes that differences between Odhner's and Azim's trematodes were due to the fact that Azim's were younger (7 days old) and had also developed in hosts (the dog and cat) that were not so favourable as the kite. Naër discusses the question whether *Cercaria rixax* of Gafsa in Tunis, found

there in *Cleopatra bulimoides* and *Melanopsis praeinorsa* is identical with Sonsino's *Cercaria vivax* found in *Cleopatra bulimoides* near Cairo and redescribed by Looss. He concludes that it is not. Moreover *Prohemistomum vivax* has not been recorded from Tunis.

The miracidia of *P. vivax* infest the snails *Cleopatra bulimoides* and *Melanopsis praeinorsa* and produce cercariae which either penetrate the skin (especially the thinner skin near the tail or under the fins) or enter the mouth of fishes. Azim has found them in *Tilapia nilotica* (the Bolis) *Mugil cephalus* *M. capito* (grey mullet) *M. auratus* (the Bouris) *Clarias anguillaris* (the Carmoot or Karamit, a cat fish) and in tadpoles. The metacercariae develop in these which are eaten raw or imperfectly cooked by man, dogs, cats and kites (*Milvus migrans aegyptius*), the kite being the best host. Azim found the flukes in 36 and 59 per cent of Cairo dogs on separate occasions and in 90 per cent of Cairo cats, none was found in dogs of Alexandria, which could not eat the Nile fishes. Nasr concludes that *P. vivax* is restricted to Egypt and Palestine. He found no record of it in Europe or America.

The adult flukes are not common because they have a short life, produce few eggs (only four or five are present at any one time in the mature uterus) and are small and often overlooked (0.74–1.11 mm. by 0.52–0.61 mm.). Azim however recovered 2,000 specimens from a man complaining of dysenteric symptoms. Nasr suggests that many patients diagnosed as dysentery may be infested with this fluke and should be given *Filix mas* to remove it. A survey of the incidence of the various stages in man and other vertebrate hosts, snails and fishes is advisable.

G. Lapage

ITOLZ (Oscar Anibal). Equinococos primitiva experimental. Inmunidad y alergia en la hidatidosis: su expresión anatómica. [Immunity and Allergy in Hydatid Disease].—*Boletín Inst. Clin. Quirúrg.* Buenos Aires 1942. Jan.–Apr. Vol. 18 No. 144 pp. 49–109. With 78 figs. (2 coloured). [53 refs.]

SAWITZ (Willi). The Buoyancy of Certain Nematode Eggs.—*Jl Parasitology* 1942. Apr. Vol. 28 No. 2 pp. 95–102.

The buoyancy of the eggs of *Enterobius vermicularis* and *Trichuris trichiura* of man, *Trichuris vulpis* and *Ancylostoma caninum* of the dog and the fertilized and unfertilized eggs of *Ascaris lumbricoides* was tested in zinc sulphate solutions. The values thus determined are not necessarily their actual specific gravities. For their concentration by centrifugal floatation a solution with a specific gravity higher than that of the eggs is needed.

An emulsion of the faeces mixed by a mechanical stirrer in physiological saline was strained through one layer of cheese cloth and sedimented for 6–12 hours or overnight and the approximate number of eggs in a measured amount of the suspension was determined by resting a cover glass on the ground top of a 10 ml. Wassermann tube containing 45.6 per cent zinc sulphate solution of specific gravity 1.250. Similar tubes, resting on four metal fingers of their metal holders, were used for centrifugal floatation of the eggs in solutions of different specific gravities. After spinning at 2,640 r.p.m. for 100 seconds, the cover was removed, due regard being given to the care in doing this emphasized by LANE. Repeated spins after refilling the

tube each time gave five such covers. The supernatant fluid was then put into two fresh tubes, the specific gravity was raised by adding zinc sulphate solution of sp gr 1.250 or 1.300 till it was over 1.200 and two or three covers were obtained from these. The sediment of the original tube was mixed again with zinc sulphate of sp gr 1.250 and 5-7 more covers obtained from it. Finally the sediment of each tube used was examined directly by spreading it on slides, the number of eggs so found being always under 1 per cent. Counts of the eggs on each cover showed the distribution of eggs in the surface layers, upper and lower parts of the supernatant fluid and in the sediment after centrifugation.

The eggs of *E. vermicularis* were floated in a solution of sp gr 1.115 or higher. A solution of sp gr 1.180 yielded 97 per cent. of the eggs in the surface layer and 70 per cent. on the first cover glass. There was no essential difference when the fully embryonated eggs were tested 24 hours after being passed and after five days in the refrigerator.

The eggs of *T. trichiura* were floated up in solutions of sp gr 1.150 and higher. Solutions of sp gr 1.180 yielded 85 per cent. of the eggs in the surface layer and 52 per cent. on the first cover glass. Solutions of 1.200 yielded 99 and 90 per cent. respectively. Centrifugation at 2,640 r.p.m. (top speed) for 50 and 280 seconds respectively gave fewer eggs than spinning for 100 seconds. Zinc sulphate apparently interacts less with the eggs than does salt solution and so gives more reliable counts.

The eggs of *T. vulpis* were floated up in solutions of sp gr 1.150 and higher. Those of *A. caninum* were floated in solutions of sp gr of 1.055 and higher. Sp gr of 1.150 floated 92 per cent., sp gr 1.180 floated 100 per cent. with 87 per cent. on the first cover glass. This agrees with Lane's finding that a sp gr of 1.150 is needed for floating up human hookworm eggs (this Bulletin 1940 Vol. 37 p. 477). The fertilized eggs of *A. lumbricoides* differed in buoyancy in different experiments between sp gr 1.110 and 1.130. Solutions of sp gr 1.180 floated almost all of them with 57-79 per cent. on the first cover glass. Solutions of sp gr 1.200 gave 94 per cent. on the first cover glass. Solutions of sp gr 1.200 floated only 39 per cent. of the unfertilized eggs while solutions of sp gr 1.250 floated 89 per cent. of these.

G. Lapeze

ANDREWS (Justin). New Methods of Hookworm Disease Investigation and Control.—*Amer Jl Public Health*. 1942 Mar Vol. 32 No 3 pp 282-288 With 3 figs [12 refs]

In spite of a marked reduction in the incidence and, presumably in the intensity of hookworm disease in the southern American States, the disease still causes physical disability and economic handicap and attempts to control it are expensive. Almost all State and local health authorities still think that hookworm infestation is tantamount to hookworm disease. Anthelmintic treatment is not related to the clinical condition, the relative size of the worm burden or the probability of prompt re-infection. Laboratory, epidemiological, engineering, nursing and administrative activities are often not co-ordinated and much waste of effort occurs.

In Georgia a parasitologist directs the Hookworm Service established late in 1939 and he approves requests for hookworm surveys, so that

wastage of effort is avoided. First the incidence of hookworm infestation for the previous 10 years was tabulated by year and county and a map of Georgia showing it was made (illustrated). Local health personnel were told that if hookworms remove blood more quickly than it can be replaced anaemia results. If not there is a subclinical infestation. The primary object should be to detect prevent and control the disease rather than the subclinical condition. Disease will be more likely and more severe where worm burdens are high and iron protein consumption low. Where iron protein consumption is adequate subclinical conditions will in general occur whatever the worm burden. Where it is low chronic progressive anaemia will result whether hookworms are present or not so that all anaemia is not necessarily due to hookworms and cases that are not must be differentiated from those that are. The intensity as well as the incidence of hookworm infestation must be known and related to the diet and anaemia of the people.

A programme of attack was devised, based on the facts that (1) Hookworm disease is absent where there are approved facilities for disposal of domestic and school excreta. Areas where these exist can be omitted. (2) hookworm larvae develop best in sandy and sandy loam soils so that strictly clay regions can be omitted. (3) the disease is rarely a problem in Negroes who can be omitted. (4) it occurs chiefly among the poorer classes. (5) families rather than individuals should be studied. (6) the average individual worm burden tends to increase with the number of infested members of a family so that large families are more likely to reveal the disease.

Thus most cases will be found by examination of large white low income families living on sandy or sandy loam soils without proper facilities for disposal of excreta and with evident clinical anaemia.

By home visiting of families selected on this basis faecal samples were collected from one or more anaemic members of each family under 20 years of age (because most cases in Georgia are under 20) and examined by brine floatation. Egg counts were made in positive cases by Stoll and Hausheer's small drop dilution method. School surveys preceded home visiting where sandy soils poverty and insanitation predominated. The earlier method of examining all members of suspected families had to be abandoned because of practical difficulties but the work showed that the egg count of the first anaemic member of a family under 20 to be examined roughly represented the average intensity of infestation of all the members of that family under 20. Follow up counts of individuals with counts of 2 000 eggs per cc or more were done at first but after further work this figure was raised to 5 000 eggs per cc or more.

These methods must miss some cases but it is claimed that they reveal the bulk of the hookworm morbidity with a minimum expenditure of time travel and materials. They exclude the much larger group of cases with hookworms but no disease. There is no useful health purpose in trying to eliminate hookworms from these. These patients generally suffer from iron deficiency dietary anaemia being more prevalent in Georgia and apparently also in Florida than the hookworm disease often and perhaps always associated with it. The two should be attacked together.

When hookworm has been found in families medical men treat them anthelmintics being provided free. Haemoglobin recovery after worm removal is slow unless iron is given especially when iron is

deficient in the diet. Iron, without worm removal will rapidly improve the blood picture but the improvement is not sustained. Iron is therefore given, mostly as Blaud's pills, before deworming if the anaemia is very severe (Hb 5 gm. or less) and after deworming if it is moderate. Greater intake of iron is encouraged. The sale and use of sewage disposal structures is promoted but little effect is expected from this because so few can afford them. If no sanitary facilities can be provided, all members of a family are urged to have two worm treatments during the cold months to reduce the worm burdens at the time when re-infestation from each other is less likely than in the summer. AUGUSTINE's observation in Alabama that polluted soils do not contain larvae from the end of December until March (temperatures below 50 C. are unfavourable to them) is confirmed in Georgia, and the likelihood of re-infection then is further decreased by the fact that the people wear boots then if they wear them at all. Andrews showed that two treatments with tetrachlorethylene completely removes the worms from about 90 per cent of patients and reduces the egg output by 99 per cent. If these treatments were given during the winter it is unlikely that the disease would reach clinical intensity for several years.

G. Lapage

MILLSPAUGH (J. A.) & SOMPAYRAC (L. M.) Creeping Eruption, Infestation with *Ancylostoma brasiliense* Larvae.—*U S Nat Med Bull* 1942, Apr Vol. 40 No 2, pp 393-396 With 1 plate.

Skin infestation by the larvae of *Ancylostoma brasiliense* a nematode (hookworm) parasite inhabiting the small intestines of the dog and cat incapacitates increasing numbers of persons employed in naval expansion in an area where the disease is endemic namely the American Atlantic seaboard the Mexican Gulf and neighbouring islands and Central and South America. Infestation comes especially from moist sandy soils contaminated by the faeces of dogs and cats and is worse during hot, rainy seasons. Men who work in contact with moist soil are especially liable but everyone is susceptible. Most of the cases seen were in men who had lain about the soft, white sands of the beaches of Jacksonville Fla. which are not normally washed by tides when they are washed by storms or chilled in winter cases are fewer.

When the larva penetrates the skin a stinging pain is felt similar to that caused by a mosquito bite. Within one to three days itching indurated papules appear which develop into tortuous raised, erythematous migratory lines 1-2 mm wide which mark the progress of the larvae. These tracks may cross double back and produce erratic patterns. A photograph of a patient shows these lesions. The larvae may cover 1-30 cm. in 24 hours but they rarely go beyond a few inches from the point of penetration. As the eruption advances at one end it fades at the other. Warmth quickens the progress of the larvae and they move further during the night, when the itching is especially troublesome. Sleep readily follows excoriation caused by scratching. The only general manifestations are cosmophobia and fatigue due to loss of sleep. No adults of *A. brasiliense* were found in the stools of the patients.

The treatment recommended is (1) Refrigeration by the ethyl chloride spray directed 0.5-3 cm. in front of the acutely inflamed end

of the burrow where the larva is situated spraying should be continued to the blanching stage and until the skin feels like old leather to the fingers any burn produced is not serious spraying may have to be repeated on burrows in thick skin e.g. on the sole of the foot (2) the galvanic cautery after injection of 0.5-1 per cent procaine canterization should be continued until a small burn is produced one application is enough To locate the larva wash the skin with 70 per cent alcohol, apply cedarwood oil and examine with a lens or with the low power of the microscope the area round the larvae can then be seen as a yellowish white mass or a collection of small vesicles

Control measures comprise the exclusion of dogs and cats from the beaches restriction of bathers to parts of the beach that are washed by the tides the wearing of shoes and avoidance of contact with damp sand or soil and the treatment of dogs and cats with tetrachlorethylene to remove the worms

G. Lapage

MAPLESTONE (P. A.) *Trichostrongylus* Infection in Man.—*Indian Med Gaz* 1941 Dec. Vol 76 No 12 pp 710-712 With 1 text fig & 1 fig on plate

Trichostrongylus is not common in man and only a few worms are present at a time they do not usually cause objectionable symptoms but their eggs are often confused with those of hookworms and many persons with so-called incurable hookworm infestations are found to be passing eggs of *Trichostrongylus* only No known anthelmintic will eradicate *Trichostrongylus* in man [phenothiazine might be tried with a careful watch for the transient anaemia it may cause] in consequence when eggs of *Trichostrongylus* are confused with those of hookworms false impressions of the efficacy of hookworm remedies may be obtained.

Measurements of 20 eggs of *Trichostrongylus* and 20 of those of hookworms showed that *Trichostrongylus* eggs are larger being 95.5-80.2 microns long by 55.3-42.4 microns broad average 88.8 by 48.3 while those of hookworms were 66.2-57 microns long by 42-38 broad average 62 by 40.8 occasionally the eggs of both may be bigger One pole of the egg of *Trichostrongylus* is more pointed it is more like a bird's egg hookworm eggs are equally rounded at both poles Microphotographs illustrate this.

Trichostrongylus appears to be widely spread in India but records of it are often missed Maplestone thinks it is almost if not quite as widespread as hookworms BOULENGER working when modern concentration methods were not in use found the eggs of it in 1.2 per cent of Indian hospital patients examined in Mesopotamia in the Great War and thought the incidence twice as high Maplestone thinks that even that is too low an estimate CHANDLER using LANE's centrifuge technique found the eggs in 10 per cent or more of workers in Bengal tea gardens where Maplestone found them in 9.1-25 per cent according to the season Chandler found them in 1 per cent at Poona 9 per cent at Dharwar and 0.5 per cent in Madras Records of the Calcutta School of Medicine show *Trichostrongylus* in 1.1 per cent of 15,578 stools examined during 11 years. SWELT by simple floatation found them in 0.4 per cent of 11,000 stools in Mysore These records refer to the eggs only there appear to be no records of the identification of the species of *Trichostrongylus* found but

Maplestone is inclined to agree with the general assumption that the species *T. colubriformis*, *T. colubriformis*, *T. probolarius* and *T. rubrus* which are parasites of sheep, oxen and other ungulates, seem to be only occasional parasites of man but *T. orientalis* has been reported frequently in man by KONO. Kono states that mice can be infested by the mouth or through the skin with *T. orientalis* whose life cycle is like that of hookworms, so that man may acquire it as he acquires hookworms.

G. Lapage

SECK (Paul) & SCHUMACHER (Walther). Ein Beitrag zur Abtötung von Spulwurmeiern. (The Killing of Ascarid Eggs.)—Zent. Bakt. I Abt. Orig. 1942, Feb. 16 Vol. 148 No. 6 pp. 314-317. With 2 figs. 15 refs.

Disinfection of farm buildings by cold or heat (hot water or the blow lamp) is not practicable. Chemical means are even more difficult. ENIGK and others showed that of the three layers of the ascarid egg the innermost fatty layer is the only one that resists chemicals. Lipoid solvents which penetrate deeply and can be sprayed on infested surfaces are therefore required. Enigk found that a 2 per cent emulsion of carbon disulphide in water killed eggs of *Toxocara canis* and *Toxascaris leonina* in 5 minutes and in 20 seconds when 2 per cent phenol was added to the emulsion.

The authors tested Eumeran, a chlorinated coal tar preparation containing organically combined sulphur which is used to kill coccidian oöcysts. They proved it efficacious against oöcysts, the reason probably being that the innermost layer of these is also fatty. They found it effective against the eggs of *Parascaris equorum* taken from the uteri of worms obtained in the slaughter house. Eggs were put in a centrifuge tube and flooded with a 5 per cent solution of Eumeran. After a time they were recovered, washed and put aside at room temperature and their development was watched. After 2½ minutes in the Eumeran all the eggs were killed. No development had occurred in them after 16 days in which time untreated eggs had completed their development.

Similar work with embryonated eggs showed that a longer immersion in 5 per cent Eumeran was needed to kill these. After 2½ minutes 49 per cent were killed, after 5 minutes 91 per cent and after 7½ minutes 97 per cent. The killed eggs were markedly deformed. Larvae in untreated controls were motile.

The authors think Eumeran would be effective against the eggs of other ascaroid species, because Enigk showed that the eggs of species in birds were not appreciably more resistant than those of dogs and ZAWADOWSKY claims that there is little difference in the resistance of the eggs of the ascarids in various mammals. Strongyle eggs are less resistant than those of *Ascaris* and should be killed more quickly by Eumeran.

To test the efficacy of Eumeran against coccidian oöcysts the authors sprayed a 5 per cent solution of it on a rabbit house with a floor space of 70 x 80 cm. covered with a layer of faeces about 0.5 cm. thick. The oöcysts were killed. In sunny weather with a maximum day temperature of 28°C the sprayed surfaces retained their dampness for 120 minutes.

G. Lapage

- i. Low (G Carmichael) The Nomenclature of the Pacific Filaria.—*Trans Roy Soc Trop Med & Hyg* 1941 Nov 29 Vol 35 No 3 pp 197-198
- ii. MANSON BAHR (Philip) Zoological Nomenclature as Applied to Medical Zoology, Parasitology and Bacteriology With Special Reference to the Status of the Pacific Filaria. [Correspondence].—*Ibid* 1942 Jan 31 Vol. 35 No 4 pp 237-239
- iii. LANE (Clayton) The Name of the Nonperiodic *Wuchereria* of the Pacific.—*Ibid* 1942 May 5 Vol 35 No 6 pp 327-332. [10 refs.]
- iv. BAYLIS (H A) Zoological Nomenclature and Medical Science [Correspondence]—*Ibid* pp 333-334

These papers are concerned with the nomenclature of the filaria of the Pacific and with the suggestion made by Manson Bahr [this *Bulletin* 1941 Vol 38 p 361] that in view of its biological differences from *Wuchereria bancrofti* in other parts of the world it should be known as *Wuchereria pacifica*

i. Low points out that zoological classification is based upon morphological characters [which is admitted by Manson Bahr] and that where differences are slight as between *W bancrofti* and *W malayi* a trinomial name indicating sub-specific differences may be advisable for instance the latter may perhaps be known as *W bancrofti malayi*. With reference to the Pacific filaria Low recalls that the embryo found in the Philippines by ASHBURN and CRAIG in 1906 if it was of *W bancrofti* could not be re-named but if as Manson Bahr suggests it was of *W malayi* then the name *philippinensis* given by those authors holds good. Again if that embryo was the same as the Pacific form then the Pacific filaria must be named *W philippinensis* or *W bancrofti philippinensis* if any change is made and therefore the specific name *pacifica* is ruled out. He concludes finally that the Pacific filaria must be regarded only as a biological race of *W bancrofti*.

ii. Manson Bahr admits that his original suggestion overstepped the limits of strict zoological nomenclature but claims that strict application of those rules cannot be and in fact is not enforced in medical zoology. He argues that biological features should be taken into account in nomenclature where those features are important in differentiation and in human medical interest and gives the instances of the races of *Anopheles maculipennis* (whose only morphological difference is in the egg stage) *Trypanosoma rhodesiense* and *T gambiense* (morphologically identical) *Leishmania donovani* *L infantum* *L americana* and *L tropica* and the spirochaetes of relapsing fever. All these are commonly known by the different names but cannot be distinguished morphologically. In bacteriology the rules break down [but bacteriology is not zoology]. He makes a plea for a new International Standard in view of the importance of factors other than morphology in medical parasitology and therefore in nomenclature in relation to medicine.

iii. Lane cannot accept Manson Bahr's suggestion because he holds that zoological classification need not relate to medical matters and that nomenclature is a purely zoological concern. He makes the point that because infringements have already been made this does not justify others. With regard to the Pacific filaria he denies that periodicity is a valid differentiation and considers that the clinical differences in filariasis are due to reactions of the host rather than of

the parasite possibly because of the difference of dress habits and therefore of areas of skin attacked by mosquitoes. He states that non-periodic infection has been found in the Sudan and that therefore geographical differentiation is not possible. *Aedes variegatus* is as easily infected by the periodic as by the non-periodic strains—thus, therefore cannot be taken as a differentiation [but there seems to be some evidence that the non-periodic form does not readily infect *Culex fatigans* the common vector of the periodic form]

iv Baylis states that the rules of zoological nomenclature do not exclude differentiation on physiological or biological grounds. He considers that until examination of a large number of specimens is made to exclude possible slight morphological differences it would be preferable to adopt Low's suggestion that the non-periodic form be regarded as a race or variety with a trinomial designation which however may prove to be a synonym of an existing name. C II

VARGAS (Luis). Nota sobre el papel de algunos artrópodos en la transmisión de *Onchocerca volvulus*. [Investigation of the Transmission of *O. volvulus* by Certain Arthropods.]—Rev Inst Salubridad y Enfermedades Trop. Mexico 1941 Dec. Vol 2. No 3-4 pp 365-373. 18 refs.] English summary

To onchocerca infected individuals who by previous examination showed microfilariae in the skin we applied different arthropods who were dissected after their repletion with blood. We looked in the Malpighian tubes, mid and posterior intestine for microfilariae. Only one out of 55 *Cimex lectularius* showed microfilariae, or 1.8 per cent of the total. Of 24 *Triatoma picturata* only two or 8.3 per cent of the total were infected. Of 49 *Pediculus humanus corporis* and of 23 *Pediculus humanus capitis* only 3 had microfilariae. All the 33 *Aedes aegypti* and the 10 *Anopheles pseudopunctipennis* were negative. Twenty-seven *Ornithodoros furcata* were examined of whom 12 or 44 per cent were positive.

Probably *Simulium*, *Calicoides* and ticks can take microfilariae due to the arrangement of the maxillae and hypostoma teeth. We can discard the ticks as vectors considering the *Calicoides* for future investigations.

ELLIOTT (Mountjoy). A New Treatment for Dracontiasis.—Trans Roy Soc Trop Med & Hyg 1942, May 5 Vol 35 No 6, pp 291-301. With 1 fig & 1 chart

The author discusses the incidence, pathology, diagnosis and clinical signs of dracontiasis. Few reliable figures of its incidence are available. The blood picture does not help diagnosis. Intradermal tests are rarely necessary. A patient showing a bullous blister or sinuses on the feet or legs in a district where the disease is endemic almost certainly has dracontiasis. At earlier stages the shape of the worm may be seen under the skin when this is viewed by reflected light after spraying it with ethyl chloride. Worms pointing in unusual positions such as the thighs, hip, scrotum, hands, forearm and chest may confuse diagnosis. If the worm is deep or is burrowing along fascial planes, a wrong diagnosis of carbuncle, deep cellulitis, gumma, onchocerciasis, rheumatism, acute focal myositis, sciatica, focal periostitis, etc. may be made. X-rays may show up calcified tracks of the worm. In such cases the patient's opinion is often valuable.

Six clinical types occur (1) worm in the tissues no sinus blister or visible tract no inflammation (2) the same but with inflammation (3) blister sinus visible track or worm pointing at a sinus no inflammation (4) the same but infected (5) residual types with fibrotic infiltration of the tissues e.g. skin muscles, tendons joints mechanical defects in associated structures (6) the same but no interference with mechanism or locomotion

Attempts to extract the worm surgically are usually unsuccessful and serious infection may follow them

The author tried injections of phenothiazine with success. He emphasizes that his method of preparing the drug and the technique of injection must be strictly followed. He quotes some of the literature dealing with the toxic effects that have been attributed to phenothiazine [see this *Bulletin* 1942 Vol. 39 pp 192-193 464-465 560] but none of the 23 cases he treated showed any ill effects although he gave as much as 8 gm intramuscularly in doses of 2 gm. at weekly intervals.

Packing phenothiazine into incisions in the thigh was first tried but little phenothiazine was absorbed into the blood when sterile tablets were inserted under the fascia lata of the thigh more promising results followed but injections were best. The author prepared an emulsion of phenothiazine in olive oil and *adepts lanae* and sterilized and stored it in medicine bottles (2 oz) [but unfortunately does not clearly state the proportion of phenothiazine in the emulsion. From the summary at the end of the paper one is led to infer that 20 cc. of emulsion contain 1 gm. phenothiazine]. He describes his technique in detail giving as an example a guineaworm sinus on the dorsum of the left foot with palpable tender induration of the associated calf muscles. Three injections are first made with 3 per cent Novutox the first (2 cc) into the vastus medialis muscle of the left thigh slightly to the outer side of its centre leaving the needle in the second into the calf muscles of the upper third of the left leg and the third into the dorsum of the lower third of the left leg avoiding the tendo achillis. Phenothiazine emulsion is then poured from a medicine bottle previously put into boiling water into a spirit fired pot and 20 cc. are taken into a 20 cc syringe. After removing the needle marking the site of the first injection into the thigh 20 cc of phenothiazine emulsion are injected along the track of this needle by means of a Bristol transfusion needle. The emulsion must not be too cool or it will block the needle. In a similar way 10 cc of emulsion are injected into each of the other sites where Novutox was injected. The injection sites are firmly massaged for a few minutes. Both local and general concentration of the drug are important and half the emulsion must be injected as near the worm as possible. With multiple infestations many points may have to be injected and it is perfectly safe to give as much as 4 gm phenothiazine at a sitting. Injections are given at weekly intervals more than two courses are rarely needed. Injections are always intramuscular never into sinuses.

Out of 59 cases treated in a general military hospital in West Africa 56 were Nigerians three from Sierra Leone. Of the 23 treated with phenothiazine injections none relapsed and none showed any toxic signs or symptoms although as much as 8 gm was given (2 gm at weekly intervals). Since the introduction of phenothiazine no cases have been boarded out of the army thus is in great contrast to the results of older methods of attempted extraction of the worm. The full effects

of phenothiazine need 5-7 days. If a worm is being extracted it is better to wait this time after injections before continuing to extract. After injections it is often possible to extract over a foot of worm at a time. If no worm is presenting and there is simply a discharging sinus or tissue induration without sinuses injections of phenothiazine in one or two places in the affected area will reduce the induration and dry up the sinuses in 10-14 days. Nursing staff should be trained to precede attempts to extract worms by strong pressure along the worm track with the fingers for about two minutes (milking action) and after each attempt to fix the stick to the skin with strapping and to cover with a dry sterile dressing.

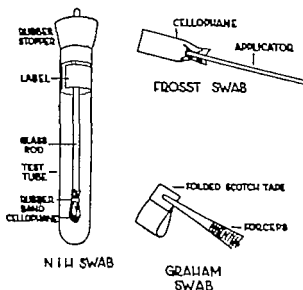
G. LaPage

MOOREHEAD (V. N.) Recent Advances in Guinea-Worm Studies.—Reprinted from *Madras Med. College Magazine* 1942. Jan. Vol. 21. No. 2. 12 pp. With 20 figs on 4 plates. [10 refs.]

KUITUNEN EKBAUM (E.) Diagnosis of Enterobiasis (Evaluation of Recent Devices).—*Canadian Public Health J.* 1942. Apr. Vol. 33. No. 4. pp. 174-176. With 1 fig.

The unreliability of faecal examination for discovery of ova of *Enterobius* is acknowledged, the reason being that the female migrates to the perianal region and oviposits on the skin outside. Hence the device of utilizing swabs for obtaining material for examination. The author compares three forms in common use: the NIH (National Institute of Health) the Graham swab and the Frost swab. The accompanying sketch in the article will save a long descriptive account.

The first enclosed in a container can easily be sent by post and examined at leisure even after some weeks, the Cellophane being



Diagrams illustrating the NIH swab, the Graham swab, and the Frost swab, for collecting material for the examination of pinworm infection.

[Reproduced from the *Canadian Public Health Journal*]

mounted in water or N/10 NaOH on a slide and gently flattened smooth by pressure of a coverslip. The second is less firm than the first and since the Scotch Cellulose Tape is folded with the adhesive surface on the other side may stick to the patient's skin and cause some discomfort to remove. In its favour is the fact that it can be stuck down on a slide for posting. The third (Frosst) has not been found so useful because the Cellophane is merely glued on to the handle and may drop off during or after the swabbing and contaminate the bed or clothing of the patient or the hand of the operator. It cannot easily be sent to the laboratory for examination.

For these reasons the author recommends the NIH swab as the most convenient and efficient
H Harold Scott

MILLER (Max J) & ALLEN (Della) Studies on Pinworm Infections
III Tests with Phenothiazine in the Treatment of Pinworm Infections—*Canadian Med Assoc J* 1942 Feb Vol. 46 No 2. pp 111-115 With 6 charts

All the children treated were males between 4 and 12 years old all were positive by the NIH anal swab method. To 48 were given tablets of gentian violet with a water-soluble coating whose thickness was adjusted so that the tablets were kept intact until they reached the vicinity of the caecum. To 75 Merck's 99 per cent pure recrystallized phenothiazine was given in chocolate tablets made by melting chocolate mixing the drug with it with an electric stirrer and making the mixture into tablets containing 1 gm phenothiazine in each with either 3 or 4½ gm chocolate. The 1 in 4½ mixture was very popular with the children a few objected to the other. The size of disintegrating tablets and gelatin capsules containing the drug made them unsuitable for children.

In experiment I children of 4-6 years had 1 gm. daily for six consecutive days (6 gm.) those of 7-9 years had the same daily dose for seven days (7 gm.) those of 10-12 years had the same daily dose for eight days (8 gm.) These doses were given to 50 children and were compared with gentian violet given to 48 others of whom those aged 6-9 years had 1 gm gentian violet daily for 10 days those aged 10-12 years had 1.5 gm. daily for 10 days the doses being not consecutive but given in two 5-day periods separated by 1 day free from treatment. Phenothiazine removed the infestation from 64 per cent of these children and gentian violet removed it from 60 per cent (Previous work by Miller and others showed that gentian violet given in the same doses was effective in 90 per cent of children).

In experiment II 23 children all eight years old, were each given 7 gm of phenothiazine on three consecutive days in doses of 2.5 2.5 and 2 gm. All 23 were cured. The treatment of two others of this group was stopped (when they were still positive) after 5 gm. had been given because these two children showed, on the third day of treatment abdominal cramps pallor weakness and a small rapid pulse neither of them showed a significant drop in their haemoglobin, but one had a cardiac defect.

The effect of treatment was checked by NIH swabs taken on seven consecutive days for each negative child. It was found necessary to wait at least eight days after treatment ceased before taking these swabs they were taken too early in the first experiment so that its results may indicate an efficiency lower than was actually the case.

The authors conclude that phenothiazine is probably more efficient than gentian violet but it produced a definite though in most cases slight and transient anaemia in at least half the children treated. The haemoglobin was lowest 4-7 days after treatment ceased and reached normal again in 3-4 weeks but all the children were sickly before treatment and had a rather low haemoglobin level. In the first experiment the greatest drop in haemoglobin was 29 per cent and in the second 32 per cent but the average drop in both was about the same (1.6 gm and 1.5 gm respectively) the drop however in the second experiment in which the phenothiazine was given over a shorter time was quicker the lowest point being reached on the 7th day as compared with the 13th day in the first experiment. Phenothiazine is more effective if it is given over a shorter time without decreasing the dose but there is some evidence that it may then be more toxic. Further study of its haemolytic and possible toxic properties is needed before it can be recommended for use for children.

Reference is made to the work of KUTUNEN EKBAUM [this Bulletin 1942 Vol 39 p 192] who found that phenothiazine removed Enterobius from 86 per cent of 89 children and from eight out of nine adults without ill effects and of MAXSON BAHR [this Bulletin 1942 Vol 39 p 61] who also found it good against Enterobius without toxic effects. DEEDS and others [Jl Pharm & Experim Therap 1939 Vol 65 p 354] found that it produced a transient anaemia in three adults treated for infections of the urinary tract and The Lancet [this Bulletin 1942 Vol 39 p 183] records the only case known to the abstractor of the death of a child after treatment with phenothiazine. DAVEY and LIXES [et Bulletin 1942 Vol 12 pp R7-R14] review the extensive literature on the use of this drug for nematode infestations of man and farm animals and discuss its toxicity to some of this literature. Miller and Allen also refer

G. Lapage

ACQUISTINI (D. L.) Trichinosis and Enterobiasis their Importance in New England.—New England Jl of Med 1942 Mar 18 Vol. 228. No 12. pp 488-495 (68 refs)

1 MAPLESTONE (P. A.) & BHADURI (N. V.) A Record of Trichinella spiralis (Owen, 1835) in India.—Indian Med Gaz 1942. Apr Vol 77 No 4 pp 193-195 (12 refs)

2 INDIAN MEDICAL GAZETTE 1942. Apr Vol 77 No 4 pp 223-224—Trichinellosis

i In the first of these two articles the authors record the fact that they have found numerous larvae of *Trichinella spiralis* in one cat only (the 74th examined) in the course of an examination of 100 pigs, 100 rats, 100 dogs and 74 cats in India during the past few years. After searching the literature as far back as 1865 the authors claim that this is the first authentic record of the occurrence of *Trichinella spiralis* in India. The wide distribution of *T. spiralis* suggests that it is odd that it has not been recorded earlier in India. In man in India it appears therefore to be by no means prevalent and infestations may be so slight that they are overlooked.

The diaphragms only of the above-mentioned animals were examined by digesting them in artificial gastric juice overnight and then screening

the material and extracting the larvae with a Baermann apparatus. When the larvae are alive this is a better method than microscopic examination but it may fail to reveal dead larvae because these may not pass through a Baermann apparatus. The reported incidence may therefore be slightly lower than the actual. This discovery of *Trichinella spiralis* in India means that human infestation with this parasite is possible there.

The life history of the parasite, the symptoms, course and pathology of the disease, its prognosis, epidemiology and the lack of any treatment other than that which alleviates the symptoms are discussed. Diagnosis is difficult; the disease may simulate influenza, typhoid etc. haemorrhages under the nails resembling splinters are common [sudden oedema of the eyelids and sometimes of the face, hands and body in cases resembling influenza or typhoid was a striking feature of the recent outbreaks in England (see *Bulletin of Hygiene* 1941 Vol 16 p 289)]. There is often a history of the consumption of raw or imperfectly cooked pork.

Complete eradication of the disease is very difficult because the parasite can live in almost any carnivore; the parasite does not depend on man for its maintenance. The rat is probably the most important host, but the pig is the only one that is a direct danger to man. In the cities the only pigs that escape efficient meat inspection are the lightly infested ones and the escape of these from condemnation cannot be prevented. The meat derived from them is diluted with healthy meat when sausages are made so that a relatively large number of light infestations of man may result and these may be too slight to be noticed. In country places where there is no meat inspection and where farmers distribute pig meat privately few people may be heavily infested. Prophylactic measures include the discouragement of the consumption of raw or imperfectly cooked pig meat and the prevention of giving uncooked pig meat to pigs.

ii. In the second article Maplestone amplifies the information in the first article pointing out that this authentic finding of *T. spiralis* in India does not mean that trichinosis is now or is likely to be in the near future a serious problem but that it could become so. Although man is normally infested from the pig, some primitive races eat dogs, cats and such other small mammals as they can catch and may acquire the disease from these. The caste rule against eating pork acts as a natural preventive for large numbers of the people of India, but this is not enough to explain the apparent rarity of the parasite in that country. The literature quoted shows that the best public health services in the world have failed to eradicate the parasite completely from any country. In the United States it was found that the examination of pig carcasses was so expensive in time and money that a better policy was compulsory giving of only cooked food to pigs. The disease may smoulder unsuspected in a country for years, mild cases escaping recognition and this may be especially true of India where large portions of the rural population are far away from medical aid and little is known of the causes of their death and illness excepting the commonest diseases. Further isolated primitive communities are among the chief pig breeders in the country.

It is odd that *T. spiralis* does not seem to have been found in Asia, the Pacific Islands or Australia although it is recorded from North and South America, parts of Africa and Europe; it seems to be commoner in temperate than in tropical countries. [For a fuller discussion of the

diagnosis and epidemiology of the recent outbreaks in England see this *Bulletin* 1942 Vol. 39 pp 196 197 *Bulletin of Hygiene* 1942 Vol 18 pp 289 290] *G Lapage*

DEFICIENCY DISEASES

STANUYS (Hugh S) Infantile Beriberi and Beriberi Heart.—*Lancet* 1942 June 27 pp 758-759 [30 refs] [Summary appears also in *Bulletin of Hygiene*]

The history of research on infant beriberi a condition analogous to acute cardiac breakdown in fulminant adult beriberi is traced. The theory of Japanese workers that the condition is due to an increase in methylglyoxal in the mother's milk consequent on a low content of glyoxalase conditioned by vitamin B₁ deficiency has probably much truth in it. The increase of bisulphite-binding substances (BBS) in beriberi is not all due to pyruvic acid, and treatment with vitamin B₁ may cause a fall in the blood pyruvic acid with only a slight reduction in the BBS. It is known that exercise in vitamin B₁-deficient subjects may cause a large rise in the BBS followed by fulminant beriberi. PLATT and LI concluded that pyruvic acid itself was not the direct cause of the acute heart failure but the author considers that some substance associated with disordered carbohydrate metabolism in muscle plays a part in the beriberi syndrome. Though methylglyoxal is not included in the accepted scheme of carbohydrate metabolism it seems certain that it is an intermediate product perhaps in some alternative path. It is suggested that its accumulation in adult vitamin B₁ deficiency may be due to a failure of glutathione (glyoxalase coenzyme) which would result in the accumulation of methylglyoxal. The best therapeutic results have always been obtained with yeast preparations and yeast is rich in glutathione. Is it possible that the pyruvic acid accumulation of vitamin B₁ deficiency inhibits the action of glutathione on methylglyoxal? In infant beriberi the infant may be poisoned by the methylglyoxal, without glutathione being present in the mother's milk, whilst the mother escapes symptoms possibly as a result of excretion in the milk. It is not definitely known whether methylglyoxal is toxic; it may even be an essential metabolite in heart muscle which in the absence of glutathione cannot be utilized with the result that the heart fails. Our views on the aetiology of beriberi if we regard it in terms of pure thiamin deficiency may need considerable revision. It should be recognized that isolated cases of infant beriberi may occur in Britain and would not be recognized by anyone unfamiliar with the symptoms a description of which is given *H N Green*

CASTELLON (M) Pellagra [Pellagra].—*Rev. Argentina de Dermatofisiologia* 1942 Vol 26 Pt 1 pp 41-50 [21 refs]

The author after some remarks on pellagra in general, such as are to be found in all text-books speaks of 33 cases under his personal observation in the four years, 1938-41. Sixteen were males 17 were females 10 and 13 respectively showed a complete picture of the disease five and two had a few of the symptoms and one and two

presented pellagral erythema only. Five men and four women died. Three of the women had tuberculosis also; one man and one woman were suffering from L.I. (ano-rectal syndrome); one man had secondary and one woman tertiary syphilis.
H Harold Scott

PURCELL (F M) *Nutritional Glossitis and Vitamin B₂ Therapy*—*Trans Roy Soc Trop Med & Hyg* 1942. May 5 Vol. 35 No 6 pp 323-326

The author describes the cases of six schoolboys in the Gold Coast who developed sore tongue and in most instances scrotal dermatitis while in a boarding school. Such cases are not uncommon in schools and prisons; the diet (and, indeed, the general diet in the Gold Coast) tends to be poor in riboflavin. Treatment with nicotinic acid failed to improve the condition but all the patients were cured in a few days by riboflavin. The condition arises apparently in association with change from home to school diet yet an attempt by questioning to determine essential differences between the two did not lead to a satisfactory solution.

The work of other observers in the tropics is recalled and the fact that no consistently good results in the condition have been obtained by the use of nicotinic acid alone is referred to. There appear to be two syndromes, the nicotinic acid and the riboflavin syndromes and glossitis may be the sole minor symptom of either of them. If the glossitis is accompanied by cheilitis, scrotal eczema and perhaps dimness of vision, it is likely to be due to lack of riboflavin. If it is accompanied by diarrhoea and pellagroid dermatitis it is likely to be due to lack of nicotinic acid. Both deficiencies are variable components of pellagra.

The author notes that dimness of vision has been a symptom in the Gold Coast and elsewhere and that the patients concerned, though presenting no other sign of vitamin B deficiency responded rapidly to treatment with marmite.
C W

DUCKWORTH (Geoffrey) *Ariboflavinosis. Report of Two Cases.*—*Brit Med J* 1942 May 9 pp 582-583

The author reports two cases in which he believes the condition to be that to which American writers have assigned the term ariboflavinosis. [While the clinical description bears some resemblance to that condition on the whole the cases are unconvincing and it must be remembered that there are other causes for cheilosis and angular stomatitis than riboflavin deficiency. In both cases local treatment was given and the patients were only seen two and three weeks later so that the therapeutic test is of no value.]
H S Stannus

HAEMATOLOGY

NAPIER (L Everard) & EDWARDS (M I Neal) *Anaemia in Pregnancy in Calcutta. An Analysis of Haematological and Other Data from 529 Pregnant Women.*—*Indian Med Res Memors Supple mentary Series to Indian J Med Res* 1941 Dec. Memoir No 33 pp iv + 135 With 7 graphs.

Although previous papers of the authors have dealt with much of the ground covered by the present memoir this latter forms a convenient summary of their views on anaemia in pregnancy

Blood examinations were made of 128 "normal" non-pregnant women, 64 "normal" pregnant women and 467 clinically anaemic and slight grades and by a cross division, into microcytic normocytic and macrocytic types. The normal pregnant women showed a lower haemoglobin level than the normal non-pregnant group but no progressive reduction of haemoglobin occurred during pregnancy although the cell size increased as pregnancy progressed a similar increase in cell size occurred in the anaemic pregnant women, but the type of anaemia, macrocytic or microcytic, tended to remain constant throughout the pregnancy. The large majority of cases showed evidence of iron deficiency most prominent in the macrocytic types due probably to the iron intake being insufficient for the needs of pregnancy. This deficiency although widespread, is however of secondary importance since the majority as well as the most severe of the anaemias were macrocytic. The cases coming under observation early in pregnancy were commonh macrocytic and macrocytic anaemias were common in primigravidae independently of age although microcytic anaemia was commonest among older women. There was a marked association between poverty and anaemia, between vegetarianism and microcytic anaemia. Macrocytosis showed a significant correlation with diarrhoea vomiting oedema, enlargement of the liver and spleen hyperbilirubinaemia, reticulocytosis and severe anaemia and a positive Wassermann reaction. Correlation with economic status shows that the macrocytic type of anaemia is nutritional in origin although other factors appear to be concerned. In some way it suggest a comparison with the toxemias of pregnancy while its correlation with enlargement of the spleen and liver hyperbilirubinaemia and reticulocytosis points to some haemolytic factor. The positive Wassermann reaction suggests an infective aetiology while there were also symptoms of gastro-intestinal dysfunction.

Maternal deaths were commonest in the macrocytic group and prematurity and early death of the child showed a high correlation with severe anaemia and macrocytosis. Post partum haemorrhage is commoner in the moderate than in the severe cases of anaemia.

Prophylaxis and treatment obviously include prenatal examination for the detection of anaemia. A point of milk daily is considered a minimum requirement. Vitamin B complex and iron should also be given and liver extract is required when the anaemia is macrocytic and hyperchromic sepsis or infection such as malaria should be treated. Failure to respond to such anti-anaemic treatment may require blood transfusion which is best given by the drip method, but intramuscular injections of whole blood, 20 cc on alternate days may be simpler and seem hardly less effective.

F. Margatroid

SCHLEICHER (Emil Marx). The Origin and Nature of the Cabot Ring Bodies of Erythrocytes.—*J. Lab & Clin Med* 1942, May Vol 27 No 5, pp 883-1000. With 1 plate & 15 figs. [47 refs.]

CABOT *J. Med Res* 1903 Vol 9 p 15 originally suggested that the ring-like structures described by him in certain erythrocytes represented nuclear remnants one common view being that they are identical with nuclear membrane but the present author disagrees

with this conception for a number of reasons. In over 2150 bone marrow aspirations covering practically all well-known disorders of the blood he has in no instance observed a greater number of Cabot's rings in the marrow preparations than were seen in those made from the peripheral blood. Furthermore the scarcity of the structures is the rule rather than the exception in severe erythroblastic anaemias and toxic anaemias associated with erythroblastæmia and icterus which lead by their very nature to severe disturbances of the denucleation process. Dark field examinations have never revealed that Cabot's rings are preformed structures. The author believes that the rings are neither nuclear remnants nor are they identical with nuclear membrane but that they are laboratory creations the expression of cellular degeneration induced by haemolytic agents and that they are formed of aggregated and denatured colloid protein. The toxic and haemolytic anaemias furnish for the most part the material for Cabot's rings in routine blood smears and there is little doubt that haemolysis plays an important rôle as a preconditioning factor for the production of the structures. They can be produced at will by delaying the drying of the blood film and from a series of experiments with films not only of blood but also of egg protein the author believes that the mode of their formation is as follows. A specific haemolytic agent (bile acid) injures the cell envelope by producing changes in the lipoprotein constituents of its surface layer which not only influences its permeability but may also lead to microscopic tears in the envelope. This physio-chemical change encourages dissociation of the lipoproteid layers leading to separation of normally fused layers the irregularity of the splitting being responsible for the variability of the flatness and thickness of the rings. This segregation of protein layers also occurs during the drying process. The staining variability depends on the character and quantity of the substance making up the ring its molecular thickness and the momentary physical state of the ring constituents.

F. Murgatröyd

VENOMS AND ANTIVENENES

BERTRAND (Gabriel) & VLADESCO (Radu) Sur l'action hyperglycémisante des venins de serpents. [Hyperglycaemia due to Snake Venoms]—*Ann Inst Pasteur* 1940 July Vol. 65 No 1 pp 5-12.

The work reported in this paper is the same as that previously recorded [see this *Bulletin* 1940 Vol. 37 p 463] except that two additional venoms have been investigated bringing the total to 16. In all cases the blood sugar was increased in guinea-pigs after injection of venom of either the Colubridæ or the Viperidæ tested. The substance responsible for this action, named by the authors hyperglycaemin is not identical with echidnase (characteristic of the Viperidæ) or neurotoxin and it is equally potent in the yellow and the colourless venoms of *Vipera aspis*.

C. W.

[November 1942]

BIZETARD (Gabriel) & VLADESCO (Radu) Sur la variation cyclique annuelle de toxicité du sang de la vipère. (The Annual Variation in the Toxicity of Viper Blood.)—*Ann Inst Pasteur* 1942 Jan. Vol 68 No. 1 pp 51-57

The authors recall the long known fact that toxic substances similar to the venom are to be found in the blood or serum of poisonous snakes. It will be remembered that the opinion has been expressed that venom is a product of tissue metabolism that it is present in snake blood and is extracted from the blood by the poison glands. See this *Bulletin* 1939 Vol 36 p 56. They found, however that the toxicity of the blood of *Lipera aspis* varied according to the season of the year as well as according to the locality in which the snakes are found. Virulence is less in spring and greatest in autumn. The same is probably true of venom from the glands though the authors admit that the few experiments they were able to carry out, because of shortage of guinea pigs suggest rather than prove this. They conclude that probably a result of winter hibernation, the production of venom is low in spring to increase with the activity of summer. Detail of experiment are given C II

BOQUET (Paul) Rôle du cuivre en quantités infinitésimales dans l'atténuation des venins de *Lipera aspis* et de *Naja tripudians* et d'une ruine végétale la ruine par le peroxyde d'hydrogène. The Role of Minute Quantities of Copper in the Attenuation, by Hydrogen Peroxide, of the Venoms of *L. aspis* and *N. tripudians* and of Bitch. — *Ann Inst Pasteur* 1941 May Vol 68 No 5 pp 379-398 34 ref

The author has continued the observations previously made (see this *Bulletin* 1939 Vol 36 p 80) 1940 Vol 37 p 461, in which he showed that the venoms of these two snakes were rendered non-toxic by exposure to hydrogen peroxide in the presence of minute quantities of copper acting apparently as a catalyst in a few hours at 37°C. In the absence of copper hydrogen peroxide has little attenuating power and copper alone does not detoxify the venoms. The action is slow if the quantity of copper is small and the amount of peroxide low. It is more rapid at 5°C than at 4°C. Traces of iron is made lighter alkaline to pH 8 than at pH 5-5. Traces of iron nickel and manganese had no action comparable with that of copper but chromium shows activity similar to that of copper though less marked.

The combination of copper and peroxide reduces the necrotizing power of the venom of *L. aspis* but not to the same extent as the coagulating action. The action on the venom of *N. tripudians* is similar to that on the venom of *L. aspis* but not so rapid. In spite of this however the three substances retain antigenic power after treatment thus resembling the azotoxins produced by the toxins with formaldehyde and rabbits may be immunized by the treated toxins so that they withstand doses of toxin fatal to controls serum from animal immunized by means of treated toxin was capable of neutralizing untreated toxin *in vitro* and showed precipitins against ricin.

The author reviews work on catalysts and ferments, and concludes that the inhibition of certain ferments is related to their state of

oxidation and to the integrity of their -SH groups. Copper is an oxidation catalyst the diastases are particularly sensitive to oxygen in the presence of copper but papaine and urease recover their diastatic functions after inactivation by oxidation on exposure to reducing agents such as hydrogen sulphide thioglycollate or cysteine C IV

DERMATOLOGY AND FUNGOUS DISEASES

PARDO-CASTELLO (V) & FERRER (Ismael) *Pinta Mal del Pinto, Carate.*—*Arch Dermat & Syph* 1942 May Vol 45 No 5 pp 843-864 With 9 figs [35 refs]

This is the best account of pinta known to the abstractor. It may be regarded as an amplification of the excellent chapter devoted to the subject in the new *Stitt* edited by R P STRONG. The present article opens with an historical survey from the time when in 1891 SANDOVAL put forward the parasitic fungal theory of its causation to the present when it is acknowledged to be due to a spirochaete *Sp herrejonii*. MENK in 1928 had noticed that carate patients gave many of them a positive Wassermann reaction in the early stages and all of them a positive in later stages but in spite of assertions suggestive of its spirochaetal origin it was not until 1938 that SAENZ GRAU TRIANA and ALFONSO ARMENTEROS reported the discovery of the organism.

The authors then pass to a general account of the disease from the clinical aspect its evolution, initial lesion and disseminated manifestations with good illustrations of the lesions produced, together with a description of and a table showing the cardiovascular and spinal fluid changes observable the epidemiology of the disease and experimental work on human beings which showed that superficial epidermal inoculation transmits the disease from the infected to the healthy also that though it bears certain resemblances to syphilis the two diseases are distinct and one does not confer immunity to the other. Morphologically the *Sp pallida* and *Sp caratea* cannot be differentiated. No vector is known at present and the authors believe that transmission occurs by personal contact but there is no case recorded of venereal origin. The spirochaete is very susceptible to the action of the arsenicals and of bismuth. Twenty four hours after an injection of either the spirochaete is no longer demonstrable. The organism has not yet been cultivated. Recent advances are summed up by the authors in these words —

Mal del pinto pinta and carate are one and the same disease the etiologic agent being a spirochete indistinguishable from that of syphilis and of yaws. This organism has been called *Treponema carateum* by Brumpt, *Treponema herrejonii* by León y Blanco *Treponema pictor* by Pardo-Castello and *Treponema Americanum* by Bricetto Rossi. Brumpt's denomination has the priority.

Pinta resembles syphilis and yaws in its general evolution. It begins with an initial lesion, followed by disseminate macules and plaques varying in color from pink to red slate blue brown and black and ending in a late dyschromic symmetric stage usually affecting the extremities. The complement fixation and precipitation tests for syphilis elicit positive reactions in 60 per cent. of the cases of the disease in the early stages and

in 100 per cent. in the late stages. The lesions are always superficial and never ulcerate. The early lesions sometimes resemble syphilitic treponemata, poxiasis and eczema. León y Blanco has called the early disseminated lesions "pinta".

"The appearance of the initial and early lesions is described. Cardiovascular and cerebrospinal changes have been reported by several authors. In the series of patients studied in this article 52.1 per cent. showed changes in the spinal fluid similar to those found in cerebrospinal syphilis. In 64.5 per cent. cardiovascular changes were present, most often aortitis.

"Pinta has been transmitted experimentally to man by León y Blanco both in Mexico and in Cuba. His experiences are summarized and the following conclusions drawn: 1. Mal del pinto may be transmitted from person to person by superficial epidermal inoculation. 2. Syphilis and mal del pinto are two separate spirochetoses. Patients suffering from active syphilis may acquire mal del pinto. 3. Mal del pinto confers immunity. Reactions with the spirochete of pinta are partially successful in the early stages of the disease but patients with late dyschromic manifestations cannot be reinfected.

Patients inoculated with Mexican and Cuban strains of spirochetes have parallel manifestations of pinta showing that both organisms have the same biologic characteristics and pathogenicity. The more limited and chronic type of the disease in Cuba seems to be due to peculiarities of the terrain and not to the spirochete itself.

The mode of transmission of pinta is probably by personal contact. It is doubtful that a vector exists capable of transmitting the disease."

H. Harold Scott

STILES (George W.) & DAVIS, Charles L. *Coccidioides Granuloma (Coccidioidomycosis) Its Incidence in Man and Animals and its Diagnosis in Animals.* *J. Amer. Vet. Assoc.* 1942 July 4 Vol. 119 No. 10 pp. 765-789 With 6 figs. Refs. in footnotes

This paper gives a good summary of coccidioidomycosis. Several of the points have been referred to in previous abstracts in this Bulletin 1937 Vol. 34 p. 17-1938 Vol. 35 p. 459 1939 Vol. 36 pp. 101-507 1940 Vol. 37 pp. 383-491 334 382 1941 Vol. 38 pp. 84 352, 26-391 but even if some repetition is entailed the present offers an excellent opportunity for giving a review of the whole question as related by the author.

The granulomatous form was reported from S. America by WERNICKE in 1892, from California by ROOFORD in 1894 and in California pathogenesis of a non-fatal influenza-like disease was known in Central California for many years under the name, San Joaquin Valley fever or abort valley fever desert fever and desert rheumatism, but the connection between this and the granulomatous form was not recognized until 1938 when DICKSON and GIFFORD showed them both to be due to *Coccidioides immitis*.

Valley fever begins like influenza and in some 5 per cent. of patients an eruption like erythema nodosum or multiforme appears in a few days. The fatality is negligible. Of 432 patients attacked in Kern and Tulare counties between December 1937 and Mar. 1939 all recovered without sequelae.

On the other hand the granulomatous form is chronic and progressive affecting lungs, skin, lymphatic glands, bones, meninges and other

parts—the initial lesion usually pulmonary—and has a high fatality rate. In man the lesions may be widespread in cattle confined to the lungs and thoracic glands.

Infection usually occurs by inhalation of chlamydo-spores in the dust more rarely by skin lesions or the mouth. There is so far no proof of man to man animal to animal or animal to man infection. The spores may be isolated from the soil. At one time the infection went by the name of California disease but this is as bad a name as Malta fever for undulant fever for it is found in 16 other States and has been reported also from South America, Italy and Hawaii. In animals it has been found in trapped rodents in Arizona in dogs in sheep and in bovines in Arizona Texas Colorado and Old and New Mexico.

As stated above in cattle the disease has so far been found limited to the lungs and thoracic glands. It gives rise to no symptoms and is not found till the animals reach the slaughter house. The gland affected is enlarged and contains pale tenacious yellowish pus granular and like actinomycotic pus and the gland is trabeculated. The contents may be caseous, and in old foci calcareous thus strongly resembling tuberculosis actinomycosis actinobacillosis or abscesses due to *Corynebacterium pyogenes*. Spherules of the fungus are seen in the pus by microscope and cultures may be grown from the pus. Sections show a granulomatous process consisting of connective tissue blood vessels lymphocytes plasma cells mononuclear and polymorphonuclear leukocytes a few eosinophils and giant cells and various numbers of doubly-contoured spherules often within a giant cell. The spherules may be surrounded by a rosette of clubs.

The article is illustrated by excellent photomicrographs.

H. Harold Scott

MISCELLANEOUS

VORSTICH (Ansehnat Mahalgart). Ueber die Entwicklung der Gesundheitsverhältnisse insbesondere der wichtigsten Infektionskrankheiten in Deutsch Neu-Guinea und im Bismarck Archipel in den Jahren 1922-1935. [The Principal Infectious Diseases of New Guinea and the Bismarck Archipelago].—*Dent Trop Ztschr* 1942. Mar 1 & 15 Vol 46 Nos 5 & 6 pp 113-132 137-152. [31 refs.]

OTTEK (L.). De landskoepoldinrichting en het Instituut Pasteur 1891-1940 [The Government Vaccine Institute and the Pasteur Institute (Netherlands East Indies) 1891-1940].—*Geneesk Tijdschr v Nederl Indië* 1942. Feb 3 Vol 82. No 5 pp 186-221 [Refs. in footnotes.]

MAYORAL (Pedro). Los monos de Colombia como portadores de gérmenes de enfermedades tropicales. [Colombian Monkeys as Reservoirs of Tropical Diseases.].—*Publ Lab Hig Nariño* Pasto 1940-41 pp 129-151. With 4 figs. [Bibliography.]

The author has examined apparently healthy *Platyrrhine* monkeys of the genera *Cebus* *Lagothrix* and *Ateles*. In *Cebus* and *Lagothrix* he found ring forms of *Plasmodium* intermediate between the four species found in man tertian quartan subtertian and ovale. In the abdomens of the same genera of monkeys he found adult

filariæ 8-20 cm. in length and in the blood embryos of *Acanthocheiloma peralans*. Culicoides is abundant in the district. In two monkeys one *Lagothrix* and one *Cebus* he saw trypanosomes, possibly *T. cruzi* as *Rhodnius* is common in Colombia. Finally *E. histolyticus* was seen in the faeces of a *Lagothrix* with dysenteric signs.

H. Harold Scott.

EARLE (H. Vigors) Tropical Ulcer in Trinidad.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942 Mar 6 Vol. 35 No. 5 pp. 241-256 [39 refs.]

Among the aetiological factors concerned in tropical ulcer in Trinidad Earle mentions trauma, malnourishment, insect bites and debility due to hookworm infection, malaria, syphilis, gonorrhoea and alcoholism. He describes the ulcers noting that he has never in Trinidad, seen ulcers extend into muscle, periosteum or bone or encountered the fulminating type associated with gross tissue destruction sometimes with a fatal termination. The form which begins as a papule may be associated with insect bites especially of *Culicoides*. Lymphadenitis is rare and pyrexia and constitutional disturbances are apparently uncommon in Trinidad. In treatment rest is important. For the ulcer and is followed after about 48 hours by a paste of cod liver oil 40 per cent vaseline 60 per cent applied under elastoplast. The beneficial effect of cod liver oil is attributed to vitamin A but as cod liver oil has a most objectionable smell after a short time on the ulcer and as whale oil is free from this disadvantage the latter may be used, though its vitamin A content is less. Sulphonamides by the mouth are useful in acute ulcers but not in those of long standing.

C. H.

Horr (Amanda) & Hicks (H. Mason) Transient Pulmonary Infiltrations. A Case with Eosinophilia (Loeffler's Syndrome) associated with Amoebiasis.—*Amer. Rev. Tuberculosis* 1942. Feb Vol. 45, No. 2 pp. 194-199. With 2 figs.

Loeffler's syndrome consists typically of transient pulmonary consolidations associated with attacks of asthma, cough, low grade fever, mild leucocytosis and a slightly elevated blood sedimentation rate (is sometimes absent) and a negative except for a few moist and subilar rales over the areas of consolidation. X-ray examination shows consolidations which appear suddenly in various parts of the lung and disappear only to reappear in other positions. The shadows are most frequently found in the lower lung field near the diaphragm and vary in size. They disappear in approximately a week and usually leave only fine fibrous star-shaped scars. It is probably an allergic manifestation and *Ascaris* and *Fasciola* worms, amoebae and pollen have been suggested as the sources of the allergens in some of the previously described cases. The present example was in a patient who had suffered from paroxysmal cough for three months and who presented the clinical picture described above. X-ray examination showed a triangular

shadow about 5×7 cm extending outwards from the right hilum past the middle of the lung field there was clouding of the right base laterally and anteriorly and a diffuse opacity was present in the left second intercostal space. Treated by rest in bed the clinical condition remained unchanged but another X-ray examination after 17 days showed that the original triangular shadow had almost and the cloudiness in the second left intercostal space had completely disappeared. There was however a shadow at the right base medially and anteriorly about 4×3 cm in size and there was a diffuse mottling at the left base which had not been present previously.

The stools contained *E. histolytica* cysts and on treating this infection with injections of emetine the response was remarkable. After the fifth day all the symptoms disappeared and after a further five days the chest was entirely clear although previously the signs and symptoms had persisted for three months. It is considered therefore that the case was an example of Loeffler's syndrome and that *E. histolytica* represented the source of the specific allergen. [See also this *Bulletin* 1941 Vol 38 p 539] *I Murgatroyd*

EAST AFRICAN MEDICAL JOURNAL. 1942. Jan Vol. 18 No 10
p 316 — Removal of a Leech from the Nose

The leech could not be seen even with a speculum and therefore could not be seized with forceps but irrigation with strong salt solution was tried, without success. Spraying of both nostrils with 5 per cent cocaine solution was immediately successful the leech falling from the posterior nares into the back of the patient's mouth whence it was coughed out. *C IV*

CHOPRA (Ram Nath) CHOPRA (G S) & CHOPRA (I C) *Cannabis sativa* in Relation to Mental Diseases and Crime in India — *Indian J Med Res* 1942 Jan Vol. 30 No 1 pp 155-171

This important paper deals chiefly with the findings in 600 cases of hemp-drug insanity in the mental hospitals of India the opinions expressed are based partly on a previous study by Sir Ram Nath Chopra and G S Chopra of 1 500 cases of hemp-drug addiction.

The Indian Hemp Drug Commission of 1893-1894 found that a moderate use of these drugs produces no injurious effects except in persons with specially marked neurotic diathesis. Excessive use indicates and intensifies mental instability. Moderate use produces no moral injury whatsoever.

Certain clinical features are common with all narcotic drugs others are specially associated with the particular drug but are not easy to distinguish because of the great variability of their effects depending on dosage individual susceptibility and other factors.

Of the 600 cases of insanity 460 were acute of these 200 were classed as acute confusional insanity mania of incoherent type 75 as toxic hallucinatory disturbances 70 as melancholia, 60 as recurrent toxic mania and 10 as depressive mania the 140 chronic cases were made up of 90 of chronic mania 30 of schizophrenia and 20 of dementia (secondary to hemp drugs)

[November 1942]

In 40 per cent of the acute cases the symptoms disappeared under treatment within 24 weeks of the onset. The only ascertained causal factor in 400 cases was the use of the drug in the remaining 200 cases various other factors entered into the picture the chief of these were heredity and alcohol often a combination of both of these factors. Thirty per cent of the patients were beggars or *sadhus* (religious mendicants) only 5.83 per cent were cultivators. The onset was gradual or sudden in 350 sudden in 40 and unknown in 180. The physical condition on admission was good in 230 fair in 200 in different in 80 bad in 60 and very bad in 30.

The chief symptoms recorded were — Incoherence of speech in 280 filthy habits in 234 sleeplessness in 255 destructiveness in 125 abusive and obscene language in 120 nervousness in 120 restlessness in 120 indecent behaviour in 105 homicidal tendencies in 100 deliriums in 100 sadness in 90 quarrel-someness in 65 suicidal tendencies in 60 muttering delirium in 60 and hilarity in 60. In a few cases there was complete silence talkativeness exaltation excitement or childish behaviour.

The special diagnostic features of acute hemp-drug insanity include its short duration rapid recovery under withdrawal and treatment delirium violent mania a confused excited appearance bright shining eyes congestion of the conjunctivae nervousness and aggressiveness. In chronic cases the patients are usually hilarious and cheerful. The relationship between addiction and crime is fully discussed.

The evidence is somewhat conflicting on the one hand no less than 132 of 468 *ganja* and *charas* smokers admitted to previous convictions for crime and 68 of 72 *bhang* addicts made the same admission. The authors are not convinced that these figures indicate a corresponding association between hemp drugs and crime bad characters are often addicts and poverty resulting from addiction often leads to theft and other crimes. In some cases the use of the drugs is actually a deterrent of crimes of violence though there are cases in which the drug has been deliberately taken to produce the state of mind that is essential to the commission of violence. The classical example of the use of hemp drugs for the induction of frenzy is the sect of the *Hastanans* in Persia.

In quite a number of cases indulgence in a single smoke of *ganja* or *charas* was responsible for a heinous crime and not infrequently addiction was the immediate cause of the commission of an offence. The drugs have seldom been used for homicidal or suicidal purposes.

John H. D. Meyer

MARSHALL (J. F.) Mosquito-Breeding in Stale Water Supplies.—
Nature 1942 May 23 pp 568-570 [10 refs]

The erection of numerous open tanks for water storage in urban areas has given rise to much apprehension lest they should prove a source of mosquitoes. There are only three out of the 30 species known to occur in Britain which are at all likely to breed in such places. These are *Culex pipiens*, *Culex modestus* (regarded by the author as a distinct species though some authors consider it to be a biological race of *C. pipiens*) and *Theobaldia annulata*. *Theobaldia annulata* seems to breed only in water polluted with sewage.

or other decomposing matter. It bites man freely. *Culex pipiens* breeds impartially in clear or foul water. It feeds chiefly on birds, rarely if ever attacking human beings. Neither of these species is likely to cause any mosquito nuisance from the tanks. The position in regard to *Culex molestus* is less clear. The mosquito plagues in Thames-side districts of London and in the underground railways seem all to have been due to *C. molestus* breeding in water stagnating under station platforms and between the lines in flooded cellars and cess-pools in septic tanks and in underground systems of household waste disposal. But knowledge of its natural breeding habits is far from complete. Under favourable conditions it will breed continuously throughout the year. With regard to control measures even if it should be necessary to control the harmless *C. pipiens* to allay public apprehension it is most desirable that control should be applied only to tanks in which larvae are actually present. It is to be noted that oil is extremely injurious to tanks with bituminous linings. In such cases coal tar derivatives introduced into 30 000-50 000 times their own volume of the infested water may be employed.

V B Wigglesworth

ROY (D N) GHOSH (S M) & CHOPRA (R N) Comparative Efficacy of Different Culicifuges under Laboratory Conditions.—*Parasitology* 1942 July Vol. 34 No 2. pp 152-154

Oil of citronella and a number of other substances were tested as culicifuges in the laboratory by smearing them on the arm and then exposing it in a cage containing large numbers of hungry *Anopheles stephensi*, *Anopheles obturbans*, *Aedes aegypti* and *Culex fatigans*. The most promising results were given by extracts of pyrethrum. Thus the maximum period of effectiveness of oil of citronella which was the next best was two hours whereas in some experiments mixtures containing Pyroicide 20 (diluted 1:20 in kerosene) gave protection for 3-5 hours. The authors suggest a mixture of pyrethrum and coconut oil as a cheap efficient culicifuge. They point out that these strong extracts of pyrethrum are fatal to mosquitoes that rest on the treated part and that even the vapour can paralyse the insect.

V B Wigglesworth

CHIN (Yin-chang) & ANDERSON (Hamilton H) Chloro-Hexyl-Meta-Cresol Related Cresols and Other Insecticides which have Low Toxicity for Mammals.—Reprinted from *Peking Nat Hist Bull* 1941-42 Vol 16 Pt 1 pp 45-53 [34 refs]

In their search for a cheap insecticide that can be used as a spray in an aqueous base against mosquitoes or other insects a number of cresol derivatives and other substances were tested. The most active substance found was chloro-hexyl-meta-cresol. This was effective against the fruit fly *Drosophila melanogaster* at a concentration of 1 per cent in a 1-2 per cent soap solution oil and alcohol being thus eliminated. This mixture was equal in toxicity to the pyrethrum spray used for comparison. [The pyrethrum content of the pyrethrum spray is not stated.]

V B Wigglesworth

- SWARTZWELDER (J. C.) & CALI (S. J.) Human Intestinal Myiasis due to Stryphid Larvae. Report of an Additional Case (*Eristalis tenax*)—*Amer J Trop Med* 1942 Mar Vol 22 No 2, pp 159-163 With 2 figs. [13 refs.]

Twenty-one previous cases of intestinal myiasis due to rat tailed maggots have been recorded in the literature. The case here described was in a child of six who complained of attacks of severe abdominal pain over a period of a month often followed by vomiting during which on one occasion she had brought up a maggot. Hexyresorcinol was given in a dose of 0.8 gm and within a few hours seven rat tailed maggots larvae probably of *Eristalis tenax* were passed.

V B Higginsworth

- SIGOUR (L.) Etude biologique et systématique des sarcophages myiophages du genre *Wohlfahrtia* [Biology of the Genus *Wohlfahrtia*.]—*Ann Parasit Humaine et Comparée* 1941 Vol 18 Nos 4-5, pp 220-232 With 2 figs. [52 refs.]

- SEQUEIRA (James H.) & DOWDESWELL (R. H.) "Cat Itch" from a Pet Lynx.—*East African Med J* 1942 Feb Vol 18 No 11 pp 345-347 With 1 fig.

The patient had an eruption of discrete minute raised, red papules over the trunk and upper parts of the extremities. It was completely absent below the elbows and below the upper parts of the thighs. There were no burrows and scrapings from several of the lesions failed to show parasites but in view of the similarity of the condition to cat itch, and of the fact that the patient kept and frequently nursed a pet lynx the authors asked that the animal should be brushed over clean paper and that the brushings should be sent for examination. In these brushings two specimens of a mite resembling *Acarodes cati* were found.

Itch may be derived from any animal but there is good reason to believe that the parasites cannot establish themselves in man, and that burrowing does not occur. Treatment consists in avoiding contact and the application of soothing and antipruritic lotions.

C W

- GILMORE (Hugh R.) Jr, KEAM (B. H.) & POSEY (Frank M.) Jr A Case of Sarcosporidiosis with Parasites found in Heart.—*Amer J Trop Med* 1942 Mar Vol 22 No 2, pp 121-125 With 3 figs. [14 refs.]

In the heart muscle of a child in Panama who died on the way to hospital presumably from malaria, sarcosporidial cysts were discovered during routine post mortem examination of the tissues. Study of the literature shows that this is the twelfth case of human sarcosporidiosis to be recorded. In four of these the infection was in the heart muscles. There was no indication that the sarcosporidial infection which was a light one had had any effect on the health of the child. The possibility of confusing a sarcosporidial with a toxoplasmic infection is noted.

C M Huxton

STREEF (G M) & KARMAWAN (R) Basaal metabolisme in de tropen zoowel bepaald volgens Krogh als voorspeld uit polsfrequentie en polsdruk. [Basal Metabolism in the Tropics determined by the Krogh Method and by Pulse Frequency and Pulse Pressure.]—*Geneesk Tijdschr v Nederl Indië* 1942. Jan. 13 Vol. 82 No 2 pp 72-85

1 The basal metabolic rate determined with the Krogh apparatus on normal male natives and Chinese at Sourabaya (Netherlands Indies) shows an average of 9 per cent below the Mayo standard of Boothby, Berkson & Dunn. Since normal male Europeans at Batavia gave a nearly similar reduction of the average basal metabolic rate this reduction is not a racial factor but at least for the greater part may be ascribed to living in the tropics.

2 A comparison of the basal metabolic rate obtained by indirect calorimetry with the rate calculated by the formulas of Read and Barnett for predicting the basal metabolic rate from pulse rate and pulse pressure shows in most cases a good agreement. In general both methods lead to the same conclusion concerning the basal metabolic rate being normal or abnormal. In four out of 47 observations with patients however the prediction formulas led to an erroneous conclusion. In four out of five cases reduction of the basal metabolic rate in consequence of treatment was indicated very well by the prediction formulas.

Anemia gives clearly too high a rate by the prediction formulas.

When there is no opportunity for indirect calorimetry the predicting formulas of Read and Barnett are valuable to ascertain whether the basal metabolic rate is normal or abnormal and to judge of the effect of treatment.

3 Limits are given for the tropics to indicate a probable or a certain deviation of the basal metabolic rate.

REED (Alfred C) Tropical Neurasthenia.—*Amer J Trop Med* 1942. Mar Vol 22, No 2. pp 127-130

Neurasthenia has been considered as a rather inexact functional nervous syndrome associated with defective psychological adaptation to environment and the stress of life and characterised by increased fatigability. The disease must be distinguished from gross organic disease, hysteria, psychasthenia, hypochondriasis, early schizophrenia, the depressive cycles of manic-depressive insanity and paresis before the appearance of physical signs. The symptoms and clinical manifestations are probably as varied as the elements in aetiology.

The author has already described a group of five patients who complained of asthenia, anorexia, easy tiring, palpitation, languor, variable abdominal pains, often unexplained nausea, vomiting and diarrhoea. In all these cases the systolic blood pressure was below normal. Since then thirteen more cases have been seen in them also there was marked hypotension with lowering of the blood sodium chloride and increase in the blood potassium. The blood-sugar levels were depressed in most cases.

Improvement followed an increased intake of sodium chloride and a restriction of potassium but especially the administration of adrenal cortical extract. The conclusion reached was that the syndrome was due to insufficient secretion of the adrenal cortex.

The Supplement now published, covering the four years from January 1938 to December 1941, has some 4 000 new books or revised editions added to the library in that period, and forms a useful work of reference for librarians and for readers. Though Lewis's Library was originally established to supply mainly the needs of members of the medical profession, its scope is now far wider and embraces most works of any importance. English, American and foreign (when translated) on Medicine and Science generally and on a wide range of technical subjects. At the present time when many medical men and scientists find that library facilities are curtailed by reason of evacuation or other war conditions the continuance of a lending service such as that provided by Lewis's Medical and Scientific Library is a great boon.

R. L. Sheppard

TROPICAL DISEASES BULLETIN.

Vol 39]

1942.

[No 12.

THE TREATMENT OF MALARIA

A REVIEW OF SOME RECENT PAPERS

By NORMAN WHITE C I E M.D D.P.H I.M.S (retd.)

The treatment of malaria is a subject of perennial interest. Thus in itself is an indication that finality has not yet been reached. Numerous synthetic remedies have proved their value but none satisfies all requirements. Cinchona alkaloids are still almost indispensable. The relative value of antimalarial drugs in different circumstances and the manner in which they can best be employed are matters of outstanding urgency and importance at the present time. British Empire and Allied forces are operating in many endemic and hyperendemic malarial regions many allied ships are calling at malaria-infested ports and Java which produced nine tenths of the gumme in the world's markets is in enemy hands. It is interesting to reflect how serious the situation might have been had Japan's aggressive designs been accomplished before Germany's pioneer research work had given us atabrin.

The majority of papers dealing with the treatment of malaria have certain features in common. Their authors all know how malaria can best be treated. There is a praiseworthy dogmatism about their pronouncements but there is anything but uniformity of dogma. There is not even uniformity of opinion regarding the manner in which quinine the oldest and best tried remedy of all should be administered. There is still less uniformity of opinion regarding the merits and demerits of the different remedies the indications for their use and the doses which can be safely administered in the treatment of the acute attack of malaria and in clinical prophylaxis. In great part the diversity of views is explained by the very different malarial conditions prevailing in the countries in which practical experience has been gained by differences in strains of malaria parasites, by differences in the manner in which different races of mankind react to infection and to some of the specific remedies and by differing degrees of malarial endemicity.

During the decade before this war the Malaria Commission of the League of Nations arranged for large scale observations in many different parts of the world to determine the relative value of the

cinchona alkaloids and the synthetic remedies in the treatment and in the clinical prophylaxis of malaria. Short courses of treatment were in general advocated. None of the specifics are capable of procuring *therapia strobilans magna*. In endemic regions where reinfections could hardly be avoided a certain residual latent infection appeared to be of value in building up a state of resistance or preimmunity. Recrudescences and relapses could be treated with repeated short courses as they appeared. In hyperendemic areas in which the adult native population had acquired a solid immunity against local strains of malaria, there was an increasing consensus of opinion that specific remedies should be used but sparingly little more than enough to tide infants and young children over the dangers inherent in the process of acquiring such immunity by repeated infections. For susceptible sojourners in such hyperendemic lands reliance was placed in the regular administration of specific remedies in prophylactic doses. Such considerations are applicable for the most part only to civilian populations engaged in peace time pursuits. In war other considerations predominate. Then it is necessary to keep as many men as possible fighting fit for the most part highly susceptible individuals exposed to the risk of repeated infections and the stress and strain of war in a trying climate.

It was appropriate that the Royal Society of Tropical Medicine and Hygiene should have devoted a meeting to the consideration of the treatment of malaria. In an interesting paper CHRISTOPHERS¹ surveyed the whole field of the specific medication of malaria with the cinchona derivatives and the synthetic drugs. He stigmatized as *malpraxis* the intramuscular injection of quinine. He stigmatized as *malpraxis* the intramuscular injection of atabrin was not so harmful. In atabrin (mepacrine) we have a substitute and, at the present time the only substitute for quinine.

HOWES² confined himself to a consideration of the treatment of malaria in a hyperendemic zone. In hyperendemic zones as contrasted with endemic zones *P. falciparum* malaria is predominant severe and fatal cases among the indigenous population are confined to childhood the native population having acquired an immunity. Goutches while newcomers are rapidly killed off unless protected or treated. An epidemic cannot occur among the native population who repeated infections may do more harm than good by diminishing the antilarial measures on which the immunity depends. The author considers that the vast majority of clinical attacks of malaria in adult natives of hyperendemic areas require no quinine or other specific treatment. The disease runs a mild course and terminates naturally. The prevalence of malarial parasites in the blood of adult West Africans is an indication for giving quinine. 48.6 per cent of the adult natives of Southern Nigeria show malarial parasites in their blood. Native children however may need specific treatment many cases require injections of quinine. Europeans in these hyperendemic areas are exposed

¹CHRISTOPHERS (S. Rickard). The Treatment of Malaria and Some Points about the Drugs in Use against this Disease.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942, Aug. 31, Vol. 36, No. 2, pp. 49-59.

²HOWES (William). The Treatment of Malaria in a Hyperendemic Zone.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942, Aug. 31, Vol. 36, No. 2, pp. 60-69. Discussion pp. 63-74. (Gould (Warrington) Hist. (T. Rowland) Malarious Areas (Philip) & CHRISTOPHERS (S. Rickard).)

to great dangers prophylactic ingestion of 5 grains of quinine a day is almost universal among them. This medication has its drawbacks but it has stood the test of time. In the treatment of attacks of malaria 30 grains of quinine a day are given during the acute stage and a maintenance dose of about five grains a day. Injections of quinine are frequently required and intramuscular injections have advantages. There are no empirical findings to show that intravenous injections are superior to intramuscular injections. In comatose cases the intramuscular injection of quinine together with the intravenous injection of saline and glucose is remarkably successful. In all cases fever should be treated promptly if quinine is not given promptly incessant vomiting and coma may develop. When the European leaves the hyperendemic zone treatment is advisable. For this the author has recently recommended a course of atabrin and quinine to be begun 10 days after leaving—2 tablets [each of 0.1 gm.] of atabrin and 2 five-gram tablets of quinine daily for 7 days. In the treatment of blackwater fever alkali therapy is a *sine qua non* the urine should be rendered alkaline within 24 hours.

Warrington YORKE expects a greatly increased demand for antimalarial drugs and stresses the importance of the manufacture of an adequate quantity of mepacrine (atabrin) and the conservation of existing stocks of quinine by its economic and efficient use in the treatment of malaria. In the treatment of acute simple tertian malaria nothing is gained by giving more than 20–30 grains of quinine a day in the acute stage as a suppressive treatment interrupted is preferable to continuous quinine administration. The quinine treatment of malaria in Liverpool consists of the administration of 30 grains of quinine in solution by mouth, daily for 4 consecutive days and thereafter 20 grains every Saturday and Sunday for 8 weeks or longer should a relapse occur. It is imperatively necessary to control acute attacks of malaria among an unacclimatized population and should there be a shortage of antimalarial drugs it is the suppressive treatment that would have to be reduced. A treatment suggested by Army medical authorities consists of 30 grains of quinine daily for 6 days 20 grains daily for four days interval 7 days and 20 grains daily for 7 days—400 grains of quinine in all. Even these quantities of quinine will not abolish the infection three-quarters of this quinine is wasted. Intramuscular injections of quinine are sometimes invaluable.

Yorke also referred to the Standard Army Treatment of Malaria which consists of quinine 30 grains daily for 2 days mepacrine 0.3 gm daily for 5 days two days interval pamaquin (plasmoquine) 0.03 gm. daily for 5 days. He asked what the pamaquin thus administered was supposed to do was there any evidence that it reduced the relapse rate? The question is important as the drug is difficult to manufacture.

Rowland HILL's² contribution to the discussion amplified in his paper was of special interest inasmuch as it was confined to the control of subtertian malaria in war a matter of outstanding importance. He recalled that some epidemics of subtertian malaria were uncontrollable in wars of the past including the last war and expressed the opinion that with the aid of synthetic drugs in addition to quinine

² HILL (T Rowland) Subtertian Malaria in War With Haematological Report by J W HOWELL—*Trans Roy Soc Trop Med & Hyg* 1942, Aug 31 Vol. 36 No. 2 pp. 75–88 With 4 charts. [16 refs.]

(December 1941)

it should be possible greatly to reduce the incidence of clinical subtertian malaria among troops in malarious regions. He considers that under treatment is the greatest fault in the present-day treatment of cases of subtertian malaria in hyperendemic zones. Thirty grains of quinine a day for 5 days may bring the temperature down in an attack of subtertian malaria but in a large proportion of cases recrudescences occur a week or a fortnight later. Exposure to strain and anaemia and invalidism are likely to result. Immediate and severe fatigue increase the predisposition to recrudescences. Immediate and thorough treatment should be commenced directly the clinical diagnosis is made. This should not be delayed till a positive blood film report confirms the diagnosis. He recommends for the treatment of the acute attack 0.1 gm. (printed wrongly as 0.01 gm. on p. 73 but corrected to 0.1 gm. on p. 80) of atabrin and 10 grains of quinine three times a day for 7 days. No toxic signs or symptoms have been noted in 200 cases so treated. In severe cases these doses may be increased with advantage. During the next two days 10 grains of quinine hydrochloride are given three times a day. During the following 6 days 0.01 gm. of plasmoquine and 10 grains of quinine hydrochloride are given three times a day. The plasmoquine part of the treatment might be considered optional perhaps for cases treated in the field, but should be compulsory in hospital. The intravenous administration of quinine is not a dangerous undertaking indeed it is essential at times if lives are to be saved. Medical officers should always be prepared to use it in the field. Ten grains in 10 cc. of water have very often been given intravenously. In no case have toxic effects resulted. Intramuscular injections of quinine should never be given. Extreme good results have also been obtained by the intravenous administration of soluble atabrin in doses of 0.3 gm. For anti-relapse treatment a course of 5 grains of quinine a day which may suffice for the needs of a villager is wholly inadequate for those undergoing excessive strain and venous attacks. It is preferable to give one tablet 0.1 gm. atabrin every day. Prolonged trial has shown the efficacy and uselessness of this. Recrudescences are virtually abolished. Yellow fever, the toxicity of atabrin have been much exaggerated. For the rest the use of veils and gloves the killing of adult mosquitoes with paraffin and paraffin sprays the use of mosquito nets by moving troops and the education and training of soldiers in anti-malarial measures all help to reduce malaria prevalence. The haematological investigations reported by HOWIE show the beneficial effects of the treatment outlined above.

MAXSON BAKER does not consider the intravenous or intramuscular administration of atabrin as effective as quinine administered in like manner. He agreed with Rowland Hill that relapses do not occur in persons with atabrin tinted skins.

DOVE writing with the experience of 14 years in the American tropics describes the treatment used during a period of two years in the medical care of 30,000 persons nearly all of whom had malaria. Most of the work on which they were engaged was of a temporary nature and in unsanitary areas. Patients when cured did not return.

to work but the labourer was unable to return home unless completely cured. Treatment was thorough. The treatment of malaria is not discussed according to the type of malaria present. Dove is of the opinion that treatment should be determined solely by the symptomatic indications presented and by the urgency of such symptoms and not by the form of malaria. The *minimum* treatment prescribed for a case of malaria lasts about four weeks and consists of —

- (1) Atebrin grains $1\frac{1}{2}$ thrice daily during febrile period and 4 days thereafter
- (2) Quinine grains 5 4 times a day for 7 days
- (3) Atebrin, grains $1\frac{1}{2}$ thrice daily for 5 days
- (4) Quinine grains 5 thrice daily for 5 days
- (5) Quinine grains 5 and plasmoquine grain $1/8$ thrice daily for 5 days.

In chronic frequently relapsing cases periods 3 4 and 5 of the treatment are repeated after a ten days interval. Should the atebrin give rise to toxic symptoms longer intervals between its administration are allowed 15 grains of quinine being given while waiting. The author however has never seen a patient intolerant of atebrin though quinine idiosyncrasy does exist. In neglected cases harbouring many gametocytes plasmoquine is combined with quinine in the second period of treatment.

In the few cases in which the initial treatment by mouth is impossible injections are given. This is only necessary in the first period of treatment and only atebrin is used for injection. The author considers that there are no indications for the injection of quinine either by the intramuscular or intravenous routes. Even with every care intramuscular quinine may cause sterile abscesses. Such industrial cases have been awarded 6 months total temporary disability and subsequent permanent 20 per cent partial disability, a fact which sufficiently explains the author's disapproval of intramuscular quinine injections. Atebrin if injected with sterile precautions does not produce abscesses and is not painful. moreover there is no evidence that atebrin will not do all that quinine can in the treatment of malaria. Disapproval of intravenous injection of both drugs is expressed. Intramuscular injections of atebrin are given ($4\frac{1}{2}$ grains of atebrin in $7\frac{1}{2}$ cc of distilled water repeated after 12 hours and thereafter at 24-hour intervals till oral medication is possible) in the following circumstances — if the patient be unable to swallow or to retain or absorb the drug if there be hyperpyrexia with temperature above 104°F if there be a localization of symptoms indicating a concentration of infection in important organs or systems of the body if an overwhelming infection be present or if the fever has failed to respond to oral administration. Subcutaneous injections of plasmoquine $1/3$ gram are given to chronic malaria patients with severe symptoms whose gastro-intestinal tract is not functioning normally and in whose blood are numerous gametocytes notably those of *P. falciparum*.

In addition to describing the specific treatment of malaria the author deals well with the non-specific or symptomatic treatment of the many complications that may arise in the course of malaria. In blackwater fever specific treatment is often contraindicated until convalescence is established. large amounts of saline-glucose are given to dilute and wash out the decomposition products of the red cell destruction.

Chemical prophylaxis against malaria is feasible but the author considers it to be justifiable only in temporary unsanitated localities while waiting for the establishment of mosquito control which is the

it should be possible greatly to reduce the incidence of clinical subtertian malaria among troops in malarious regions. He considers that under treatment is the greatest fault in the present-day treatment of cases of subtertian malaria in hyperendemic zones. Thirty grains of quinine a day for 5 days may bring the temperature down in an attack of subtertian malaria but in a large proportion of cases recrudescences occur a week or a fortnight later. Subsequent severe anaemia and invalidism are likely to result. Exposure to strain and fatigue increase the predisposition to recrudescences. Immediate and thorough treatment should be commenced directly the clinical diagnosis is made. This should not be delayed till a positive blood film report confirms the diagnosis. He recommends for the treatment of the acute attack 0.1 gm [printed wrongly as 0.01 gm on p 73 but corrected to 0.1 gm on p 80] of atabrin and 10 grains of quinine three times a day for 7 days. No toxic signs or symptoms have been noted in 200 cases so treated. In severe cases these doses may be increased with advantage. During the next two days 10 grains of quinine 5 days, 0.01 gm of pla moquine and 10 grains of quinine hydrochloride are given three times a day. The following might be considered optional, perhaps for cases treated in the field but should be compulsory in hospital. The intravenous administration of quinine is not a dangerous undertaking, indeed it is essential at times if lives are to be saved. Medical officers should always be prepared to use it in the field. Ten grains in 10 cc of water have very often been given intravenously in no case have toxic effects resulted. Intramuscular injections of quinine should never be given. Extremely good results have also been obtained by the intravenous administration of soluble atabrin in doses of 0.3 gm. For anti-relapse treatment a dose of 5 grains of quinine a day which may suffice for the needs of a civilian, is wholly inadequate for those undergoing excessive strain. Even 15 grains a day which can safely be administered, will not always prevent clinical attacks. It is preferable to give one tablet 0.1 gm of atabrin every day. Prolonged trial has shown the efficacy and harmlessness of this. Recrudescences are virtually abolished. Yellowing of the skin is of no consequence among troops in war. Statements regarding the toxicity of atabrin have been much exaggerated. For the rest the use of veils and gloves, the killing of adult mosquitoes with paraffin and paraffin sprays, the use of adult mosquitoes moving troops and the education and training of soldiers in anti-malarial measures all help to reduce malaria prevalence. The haematological investigations reported by Howie show the beneficial effects of the treatment outlined above.

MASON BARR does not consider the intravenous or intramuscular administration of atabrin as effective as quinine administered in like manner. Intramuscular injections of quinine can be of very great value. He agreed with Rowland Hill that relapses do not occur in persons with atabrin tinted skins.

DOVE, writing with the experience of 14 years in the American tropics, describes the treatment used during a period of two years in the medical care of 30 000 persons nearly all of whom had malaria. Most of the work on which they were engaged was of a temporary nature and in unmitigated areas. Patients when cured did not return.

DOVE (Woodell 8) The Treatment of Malaria—*Am J Trop Med* 1942
May 1 1942 N 3 pp 227-234

to work but the labourer was unable to return home unless completely cured. Treatment was thorough. The treatment of malaria is not discussed according to the type of malaria present. Dove is of the opinion that treatment should be determined solely by the symptomatic indications presented and by the urgency of such symptoms and not by the form of malaria. The *minimum* treatment prescribed for a case of malaria lasts about four weeks and consists of —

- (1) Atebrin, grains $1\frac{1}{2}$ thrice daily during febrile period and 4 days thereafter
- (2) Quinine grains 5 4 times a day for 7 days
- (3) Atebrin, grains $1\frac{1}{2}$ thrice daily for 5 days.
- (4) Quinine grains 5 thrice daily for 5 days
- (5) Quinine grains 5 and plasmoquine grain $1/8$ thrice daily for 5 days.

In chronic frequently relapsing cases periods 3, 4 and 5 of the treatment are repeated after a ten days interval. Should the atebrin give rise to toxic symptoms longer intervals between its administration are allowed 15 grains of quinine being given while waiting. The author however has never seen a patient intolerant of atebrin though quinine idiosyncrasy does exist. In neglected cases harbouring many gametocytes plasmoquine is combined with quinine in the second period of treatment.

In the few cases in which the initial treatment by mouth is impossible injections are given. This is only necessary in the first period of treatment and only atebrin is used for injection. The author considers that there are no indications for the injection of quinine either by the intramuscular or intravenous routes. Even with every care intramuscular quinine may cause sterile abscesses. Such industrial cases have been awarded 6 months total temporary disability and subsequent permanent 20 per cent partial disability, a fact which sufficiently explains the author's disapproval of intramuscular quinine injections. Atebrin if injected with sterile precautions does not produce abscesses and is not painful. moreover there is no evidence that atebrin will not do all that quinine can in the treatment of malaria. Disapproval of intravenous injection of both drugs is expressed. Intramuscular injections of atebrin are given ($4\frac{1}{2}$ grains of atebrin in $7\frac{1}{2}$ cc of distilled water repeated after 12 hours and thereafter at 24-hour intervals till oral medication is possible) in the following circumstances — if the patient be unable to swallow or to retain or absorb the drug, if there be hyperpyrexia with temperature above 104°F , if there be a localization of symptoms indicating a concentration of infection in important organs or systems of the body, if an overwhelming infection be present, or if the fever has failed to respond to oral administration. Subcutaneous injections of plasmoquine $1\frac{3}{8}$ grain are given to chronic malaria patients with severe symptoms whose gastro-intestinal tract is not functioning normally and in whose blood are numerous gametocytes notably those of *P. falciparum*.

In addition to describing the specific treatment of malaria the author deals well with the non-specific or symptomatic treatment of the many complications that may arise in the course of malaria. In blackwater fever specific treatment is often contraindicated until convalescence is established. large amounts of saline-glucose are given to dilute and wash out the decomposition products of the red cell destruction.

Chemical prophylaxis against malaria is feasible but the author considers it to be justifiable only in temporary unsanitated localities while waiting for the establishment of mosquito control which is the

(December 1942)

Extensive trials were made of provocation tests for the purpose of finding whether the patient was fit for return to duty in conditions in which proper treatment would not be available for relapse. The tests were made two or three weeks after the end of the course of treatment and consisted in the subcutaneous injection of 0.5 mgm. adrenalin followed by blood examination and careful observation of the rectal temperature. The proportion of positive results was not large but no really harmful results were observed. The method is considered suitable only for young patients who are treated in hospitals in which skilled observation is possible. Negative findings are not to be regarded as proof of cure.

[It might be suggested that a second course of treatment perhaps rather shorter than the first and started about a fortnight later would be a simpler and better method of dealing with the situation. The author regards atebrom as a perfectly safe drug with practically no contraindications so that it can be used freely as a means of diagnosis in doubtful cases but it is interesting to note that quinine is used in the very worst attacks. This suggests that it may be desirable to give a few initial doses of quinine in all cases of subtertian infection, either alone or in combination with atebrom, even when strict economy must be observed in the use of quinine.]

RUSSELL (Paul F.) & MEYON (M. Kumara). *A Malario-Economic Survey in Rural South India.*—*Indian Med Gaz.* 1942 Mar Vol 77 No 3 pp 167-180 With 2 figs [13 refs]

This paper records the results of a house-to-house survey of five villages in the Tanjore District of Madras. Three of these were in the Pattukkottai taluk where the Cauvery Mettur canal irrigation scheme which came into operation in 1933 was responsible for 4 *cultivates* carried malaria in an area that had till then been free of the disease. Two of the villages were in the Papanasam taluk. The Papanasam free of endemic malaria. Those who have had practical experience of the difficulties attendant upon any attempt to carry out surveys of this kind in Indian conditions and of the difficulties of assessing the value and significance of the information so collected, will read this report with interest not untinged with admiration.

The main purpose of the survey was to arrive at an estimation of the economic burden that malaria imposes on an Indian rural community, and to find out whether such a community could provide from its own resources funds sufficient to control the disease. It is not possible in small space to summarize the information collected. In two malarious villages data lost owing to fevers averaged 4.9 and 10.5 per head per annum. Payments for malarial fevers averaged Rs 1-6-0 and Rs 2-8-0 and wages lost Rs 0-12-0 and Rs 1-6-0 per head per annum. The largest item of expense was for travel offerings and temple sacrifices of fowl, sheep or goats. Temple and church candles cost such an illness as an attack of malaria. It is concluded that the direct financial loss due to malaria is considerably more than the amount it would cost to control the disease.

A rupee equals 16d. There are 16 annas in a rupee and 12 pices in an anna.

RUSSELL and KNIPE [this *Bulletin* 1941 Vol. 38 p 645] found that malaria could be controlled in Kasangadu one of the villages included in the survey by spray killing adult mosquitoes at a cost of Re 0-7-2 per head per annum and that by using Indian grown Pyrethrum the cost might be reduced to Re 0-4-7 per head. Bearing in mind however the very small residue of income left after paying taxes and interest on debts the imposition of a special malaria tax is not possible. As irrigation water is chiefly responsible for the malaria in this region the authors consider that it would be reasonable for a percentage of the irrigation tax to be set aside for malaria control. Once more the authors plead for more effective co-operation between agriculture public works and the health departments.

Norman White

DE ZULUETA (Julián) *Plasmodium ovale* en Colombia. [*P ovale* in Colombia.]-*Rev Facul de Med* Bogota 1942 Jan. Vol 10 No 7 pp 487-502 With 2 plates [Bibliography] English summary (8 lines)

The author describes a case of locally acquired malaria in Colombia. The blood contained numerous parasites which morphologically were indistinguishable from *P ovale*. In addition there were numerous typical *P vivax* parasites and a variety of forms partaking of the characteristics of both. Hitherto *P ovale* has not been reported from Colombia. The author's observations lead him to believe that *P ovale* is but a variety of *P vivax*. The paper contains references to a very large number of the papers concerning *P ovale* that have been published since STEPHENS's discovery of the species in 1922. The bibliography contains 31 references.

Norman White

DU TOIT (Maria L.) A Case of *Plasmodium ovale* Infection.—*South African Med J* 1942 May 9 Vol 16 No 9 p 182 With 1 fig

The case occurred in Swaziland in a native woman who complained of mild attacks of fever. Drawings made of cells and parasites leave little doubt that it was a *P ovale* infection.

C IV

BLACKLOCK (D B) & WILSON (Carmichael) Apparatus for the Collection of Mosquitoes in Ships with Notes on Methods of Salivary Gland Dissection.—*Ann Trop Med & Parasit* 1942. June 30 Vol 36 Nos 1 & 2 pp 53-62. With 8 figs.

For the collection of mosquitoes on board ship the authors devised a light compact equipment consisting of a torch and a small portable box containing a rack for holding tubes. Round bottom tubes 2 inches by $\frac{1}{2}$ inch, plugged with cotton wool were found satisfactory. Mosquitoes were collected singly in these and they could generally be identified while still alive in the tube.

The paper includes a useful illustrated summary of the various methods that have been proposed for dissecting out the salivary glands of mosquitoes. The authors propose a method which is substantially

the same as that of SHUTE though perhaps even simpler. A fine mounted needle or entomological pin and a narrow bladed scalpel (one tenth inch or less) are employed. The mosquito is killed, freed from legs and wings, and laid in a drop of saline on a slide. The neck is cut cleanly through with the knife. The blade is then placed across the thorax so that a very gentle steady pressure can be applied at a point just behind the origin of the first pair of legs. The glands will then emerge from the cut end of the neck. In the absence of chloroform ordinary motor car petrol applied to the cotton wool plug (preferably with a dry plug beneath) forms a satisfactory anaesthetic.

I B Wigglesworth

MACAN (T T) A Key to the Anopheline Mosquitoes of the Mediterranean Region and the Lands adjoining the Red Sea and the Persian Gulf.—// Roy Army Med Corps 1942 July Vol. 79 No. 1 pp 1-11 With 14 figs & 1 map
One or two of the locality records are erroneous.

P A Entwistle

WEYER (F) Beitrag zur Stechmückenfauna von Mazedonien und Westthracien [The Mosquitoes of Macedonia and Western Thrace]—Dent Trop Zisch 1942 May 15 & June 1 Vol 48 Nos. 10 & 11 pp 249-257 284-293 With 3 figs (Numerous refs)

WEYER (F) Die afrikanischen Malariaüberträger [The Vectors of Malaria in Africa]—Dent Trop Zisch 1941 Feb 15 Vol. 45 No 4 pp 112-118

EX (P) Distribution of *Anopheles sundensis* Rodenw through Mechanical Means.—// Bombay Nat Hist Soc 1941 Vol. 42 No 3 pp 583-598 With 1 map [Summary taken from Rev Applied Entom Ser B 1942 July Vol 30 Pt. 7 p 106]

The transport of *Anopheles sundensis* Rodenw to Calcutta from its breeding places, in the Sunderbans by train and country boat during 1933 and 1934 is recorded. Collections made from 234 trains at the terminal railway stations in Calcutta that have connections with the outlying breeding zones included 101 individuals of *A. sundensis* taken in 35 trains, as well as several other species that do not transmit malaria in the area involved. Those identified were *A. ayrenesi* Pall & *A. barbatipes* Wulp & *A. annularis* Wulp & *A. ramsayi* Covell, *A. philippinensis* Ludl & *A. vagus* Dön & *A. stephensi* List. Of 3 062 *A. sundensis* taken at Calcutta after passing through areas infested with *A. sundensis* 136 carried a total of 142 individuals of this species under shelter of the cargo and 4 *A. sundensis* & *A. ramsayi* were also found in them. The most favourable resting places were in cargoes of rice jute and straw. Dispersal in trains was most noticeable between June and September and by boat from July to December. It is thought that the establishment of *A. sundensis* in the Salt Lake area to the east of Calcutta has been the outcome of importation in boats as no trains stop near the Salt Lake.

ROZEBOOM (L. E.) Subspecific Variations among Neotropical Anopheles Mosquitoes, and their Importance in the Transmission of Malaria.—*Amer Jl Trop Med* 1942 May Vol 22 No 3 pp 235-255 With 31 figs on 5 plates. [74 refs.]

In this paper the author brings together present knowledge about the variations in the commoner Anopheline mosquitoes of the New World tropics. In some of these such as *A. punctipennis* there are well marked differences in relation to malaria in different localities and there are differences in egg structure but an exact correlation between the two has yet to be proved. In others such as *A. albicans* the egg structure seems to be constant but there is strong evidence of biological variations in some regions this mosquito bites man and is a carrier in other regions it ignores man and is harmless the adult characters show great variation but do not seem to be correlated with the differences in habit. *A. aquasalis (tarsimaculatus)* again seems to comprise at least two sub-species it is a man biter and malaria carrier in Trinidad ignores man and is harmless in Panama. But structural differences in egg or adult are not well defined. The author concludes that much more work is needed before definite statements can be made on the subspecies of neotropical anophelines. Such questions as the effect of environment on the morphology of eggs or on the behaviour of adults the geographical distribution of egg types and whether these change gradually in passing from one locality to another and the cross breeding of races laying different eggs all require detailed study.

V B Wigglesworth

SMITH (Gordon E.) The Keg Shelter as a Diurnal Resting Place of *Anopheles quadrimaculatus* Introduction.—*Amer Jl Trop Med* 1942 May Vol 22 No 3 pp 257-269 With 6 figs

During five years the author has tried many methods of measuring the density and composition of the Anopheline fauna in the South Eastern United States. Light traps various combinations of animal baited traps earth dug-outs and box shelters of many sorts proved unsatisfactory. The most promising results were obtained with small nail kegs [apparently about ten inches in diameter] laid on their sides in the most deeply shaded spots along the shore line near the breeding places. The mosquitoes, both males and females enter these at dawn at the first sign of light and remain there until dusk. Both *A. quadrimaculatus* and *A. punctipennis* are collected. The numbers of mosquitoes entering them increase and decrease more or less concurrently with the numbers of engorged females in barns in the same localities they probably afford therefore a true measure of the local mosquito population. It is claimed that these keg shelters have advantages of uniformity and mobility which are lacking in conventional collecting stations.

V B Wigglesworth

ANDERSON (W. A. D.) MORRISON (Dempster B.) & WILLIAMS (E. F.) Jr Pathologic Changes following Injections of Ferrihemate (Hematin) in Dogs.—*Arch Pathology* 1942 May Vol. 33 No 5 pp 589-602. With 7 figs. [17 refs.]

In the course of a study of the solubility and the titration of haemin and ferrihaemic acid MORRISON and WILLIAMS (1941) prepared a suitable

[December 1942]

solution of disodium ferrihaemate of pH 7.8. It was considered that such a well buffered solution might be of value for the relief of anaemia, and accordingly some of it was administered intravenously to a dog which had undergone severe haemorrhage but the result was the death of the dog. This fatal result was repeatedly confirmed in apparently normal dogs without previous haemorrhage. The authors became interested in the identification of malaria pigment with ferrihaemic acid and the question was raised whether the toxic symptoms in cases of fulminating malaria might be due to release of ferrihaemic acid.

Solutions of disodium ferrihaemate prepared from recrystallized haem and adjusted to a pH of 7.6 were injected into dogs intraperitoneally, subcutaneously and intravenously. Marked reactions were induced by intravenous injections, death occurring when an injection was made too rapidly or when excessive amounts were given. In one dog anaemia developed two days after the injection and persisted for 36 hours. Two dogs which survived intravenous injection were killed on the 4th and 6th days after the injection, respectively. Intraperitoneal injections were well tolerated. After several subcutaneous injections the injected areas became so oedematous and tender that further injections were not attempted.

The results of this work are described in full the following summary is given —

Ferrihaemate when injected into dogs is capable of producing acute and chronic changes in the kidneys, the reticuloendothelial system and the vascular system.

When stored in the reticuloendothelial system ferrihaemate remains as an inert and relatively harmless substance which the body appears to have little ability to metabolize.

Marked vascular reactions followed injection particularly intravenous injection of ferrihaemate. The vascular changes consisted of dilatation and congestion of small vessels, haemorrhages and thromboses.

The renal lesions were common in the central nervous system without as marked tubular blockage. The renal degenerative changes were probably due to vascular injury and obstruction rather than to any inherent specific toxicity of ferrihaemate.

Many of the changes following injections of ferrihaemate are similar to lesions which occur in malaria and blackwater fever.

Sclerotic nodules of the spleen (Gandy-Gamma bodies) resulted from deposition of ferrihaemate in the spleen. (See also this Bulletin 1942 Vol 39 p 604)

(See also this
H. York)

BELTRAN (Enrique). Infección de reticulocitos por *Plasmodium vivax* (Infection of Reticulocytes by *P. vivax*). — *Rev Inst Salubridad y Enfermedades Trop* Mexico 1941 Dec Vol 2 Nos 3-4 pp 327-345 [32 refs.] English summary.

This is a study of the preference exhibited by the merozoites of *Plasmodium vivax* for reticulocytes. The author discusses at some length the findings of the large number of workers who have dealt with this question and describes his own observations. Six cases of naturally acquired malaria and three cases of merozoephils undergoing malaria therapy were studied. The blood of some of these patients was

examined but once of others repeated examinations were made. The proportion of reticulocytes to the total number of red cells varied from 0.2 to 6.8 per cent. The percentage of ring forms of *P. vivax* found in reticulocytes varied from 12 to 80 per cent. These proportions varied greatly in different cases and also in individual cases from day to day.

Norman White

AZEVEDO (Alípio) Um caso curioso e ligeiras considerações em torno do Impaludismo. [An Unusual Case of Malaria and Some Slight Observations concerning that Disease.]—*Brasil Medico* 1942. Feb 14 Vol 56 No 7 pp 84-85

This short note describes the case of a woman aged 30 suffering from malaria who as a prelude to febrile attacks suffered from very severe epigastric pain simulating hepatic colic and urticaria with intense irritation, chiefly on the arms and neck. These distressing symptoms lasted about six hours but reappeared 24 hours after the onset of the first attack. After three such attacks the periodicity and some slight enlargement of the spleen suggested malaria a diagnosis which was confirmed. Specific treatment effected a cure. The patient had never previously suffered from any allergic conditions and she had taken neither quinine nor other drug that might have caused the urticaria.

The author offers some remarks concerning the inadequacy of much vaunted anti-malarial drugs including the well known synthetic remedies. A combination of methylene blue and quinine has given good results in his hands. He comments on the frequent association of malaria with cardiac disorders chiefly cardiac arrhythmia. In the malarious regions of the Province of São Paulo the association of mega-oesophagus and megacolon with malaria infection is sufficiently constant to justify the assumption that malaria is responsible for these disorders.

Norman White

SANDERS (J. P.) Ten Years Experience treating Malaria by the Short Course Method.—*New Orleans Med & Surg J* 1942. Apr Vol 94 No 10 pp 465-469 [12 refs]

The author has previously published several papers recording very good results in the treatment of malaria by short courses of quinidine. Until 1933 his short course consisted of four single daily 10 grain doses of quinidine; he then increased the course of treatment to five days giving two doses of 10 grains each on the first two days and single doses of 10 grains on the remaining three days 70 grains in all. In the present communication he summarizes some of the results of his experience in the treatment of malaria during the period 1930 to 1940. Of a total of 3,859 [wrongly printed as 3,656] cases, 2,215 were treated with quinidine, 1,449 with quinine, 108 with atabrin and 87 with other drugs. The author states that there is a strange similarity between all the anti-malarial drugs in that they cure from 65 to 75 per cent of cases. Idiosyncrasy is about as common with quinidine as with quinine; there were six cases among the 2,215 patients treated the reaction varying from a very mild to a moderately severe urticaria. Patients intolerant of quinidine may be able to

[December 1942]

take quinine and vice versa. Quinidine does not cause uterine contractions and so can be given safely in all stages of pregnancy, neither does it cause tinnitus. Patients who develop haematuria during the administration of quinine tolerate quinidine though the latter drug may very exceptionally give rise to haematuria. *Norman White*

BLACKLOCK (D. B.) The Prevention of Mosquito-borne Diseases in Tropical and Sub-Tropical Towns.—*Ann. Trop. Med. & Parasit.* 1942 June 30 Vol 36 Nos. 1 & 2 pp 63-74

This paper describes the methods at present employed in Freetown Sierra Leone to search out and eliminate mosquito breeding places and the training qualifications and duties of the staff engaged on this important work. It is pointed out that the number of breeding places discovered is very small in comparison with the high malaria endemicity of the town. The author makes suggestions as to how the work might be more effectively and systematically carried out than at present and at less cost. A complete scheme is elaborated in detail, this does not lead itself to summary. Health officers of tropical towns will find in the paper suggestions concerning the details of mosquito control work which are likely to be of great assistance. *Norman White*

WATSON (Malcolm) Some Emergency Anti-Malaria Measures.—*Trans. Inst. Indus. Adv. Cttee* 1942 May London Ross

In view of the loss of oil supplies in the Far East and of the necessity for conserving oil and reducing transport of oil in war time it is necessary to consider what methods of malaria control can be employed which do not involve the use of oil. While emphasizing that under certain conditions oil is imperative the author describes other methods which may be useful especially the methods of sluicing or flushing. Considerable detail is given and there are several illustrations. Reference is also made to the value of rotting vegetation faggot drains and anti-malaria hedges. *C. H.*

CHARFF (J. W.) & TWEEDIE (M. W. F.) Malaria and the Mud Lobster.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1942 June 30 Vol 36 No 1 pp 41-44 With 2 figs

The mud lobster *Thalassinia anomala* a crustacean some eight inches in length, resembling a crayfish lives in the soft mud underlying the superficial hard soil in brackish swampy areas of Malaya. It tunnels upwards to the surface and forms "crab holes" a misnomer arising from the fact that crabs use the burrows as a refuge. These mud-holes cause much damage by undermining tidal bunds and may also provide breeding places for mosquitoes. A description is given of experiments carried out on the east coast of Singapore Island with the object of finding a cheap and reliable method of destroying *Thalassinia anomala* and of preventing its burrowing in tidal bunds. A quarter to half a gallon of lime and water 3 pounds of lime to 3 gallons of water poured into the hole which is then rammed with sand destroys the lobster. This method consequently applied can free an area of periodical inspection and treatment of new holes round the margin of the area can eliminate the mud lobster.

A layer of the fibrous material formed on the trunks of coconut palms by the withering of the leaf bases soaked in coal tar incorporated in a tidal bund one foot from the top will prevent the mud lobster from burrowing up through the bund
Norman White

FULTON (J D) Attempts to prepare in Fowls a Strain of *Plasmodium gallinaceum* Resistant to Plasmoquine.—*Ann Trop Med & Parasit* 1942 June 30 Vol 36 Nos. 1 & 2 pp 75-81 [12 refs.]

The author describes an attempt to produce a strain of *Plasmodium gallinaceum* resistant to plasmoquine by keeping infected fowls during 33 passages over a period of 15½ months under the influence of plasmoquine administered orally. At the end of this period the strain which had been kept exposed to plasmoquine was no more resistant to the drug than was the original unexposed strain. The question arose as to whether this failure to become resistant could in any way be correlated with the presence of exoerythrocytic schizonts which various workers have shown to be unaffected by quinine, ateban or plasmoquine. In the present investigation the author examined a number of treated and untreated birds and found that there was no difference in the frequency of occurrence of exoerythrocytic schizonts. It would seem therefore that the resistance of the exoerythrocytic schizonts to drug treatment may account for the failure to promote a drug resistance.

C M Heron

TRYPANOSOMIASIS

CONGO BELGE RAPPORT SUR L'HYGIÈNE PUBLIQUE AU CONGO BELGE PENDANT L'ANNÉE 1940 [VAN HOOFF (L.)] pp 24-37 With 1 folding map—Trypanosomiase [Trypanosomiasis.]

For more than 15 years each big endemic area has been supervised by a branch of the Medical Services assisted by auxiliary services of missionaries or private enterprises. Although circumstances forced these medical missions to concern themselves with all types of maladies and health services they dealt primarily with sleeping sickness. As the principal attack was to destroy the human reservoir of infection by drug control as complete a survey of the natives as possible was required and owing to difficulties between the medical and administrative surveys it was necessary for a survey to be made by medical personnel dealing with all affections susceptible of treatment by a rural medical service. It is obvious that the reduction in personnel due to the war made this difficult and the survey was therefore provisionally suspended in certain sectors considered as little affected or practically cleared. Nevertheless the whole of the endemic area was inspected, special attention being given to areas of high endemicity certain of which were visited at least four times during the year. Close on 5 million natives were examined 11,837 new cases of trypanosomiasis were discovered and there were also 35,189 old cases under control. There were 4 cases in Europeans 1 in the Province of Léopoldville and 3 in the Province of Costermansville.

While the index of new infections decreased in general in the Colony the frequency of drug resistant cases increased. This is explained in

part by the persistence of certain foci despite all efforts. In such areas control with Belganyl (Bayer 205) leads to a massive but not complete reduction in the endemic index.

Researches on methods of diagnosis and treatment biological variation and transmissibility of trypanosomes identification of species, synergism of remedies, clinical aspects of the disease and its complications in man and animals have been carried out during the year. A new rural hygiene ordinance will facilitate the task of the medical services in the control of tsetse flies.

Province of Léopoldville The whole province shows some increase for the year. 1 584,846 persons were examined and 5,671 new cases were discovered, giving an index of new infection of 0.36 per cent. The principal foci are along the Congo River from Léopoldville to Kwa along the Kasai and in the Kwango to the Middle Wamba and to the east of the Kwih. In the last two areas some recrudescence was observed but that of Chenal on the contrary appeared to have been suppressed by extensive use of Bayer 205 for prophylaxis. A violent recrudescence on the Portuguese border between Kwango and Wamba is reported.

Province of Luanda In this vast endemic area a notable diminution in the index of new infections for the year was obtained, owing to intensification of measures in areas shown to be most menaced in the previous years survey. In 1940 examinations of 935 792 persons were made and 2,168 new cases were discovered, giving an index of new infection of 0.23 per cent. The tremendous loss of ground and the danger of serious recrudescence following even temporary relaxation of effort in zones incompletely cleared of infection is stressed.

Province of Coquilhatville Of 897,818 persons examined 1 429 were found to be newly infected, giving an index of new infection of 0.16 per cent. Medical control has accelerated the natural regression of the disease in the South (Tshuapa) and combated with success its extension in the North. In the interior and along the numerous tributaries of the Congo the situation improves constantly, but the basin of the river itself with its great lands inhabited or frequented by fishermen constitutes an active and dangerous area resistant to control owing chiefly to the movement of the population and topographical difficulties. Commerce and the constant traffic of the fishermen favour the extension not only of sleeping sickness but also other diseases.

Province of Stanleyville The condition is in general stationary special attention having been given to the active foci found in 1939. Among 552 697 persons examined 192 new infections were found, giving an index of new infection of 0.039 per cent. The region of Lake Albert where 10 per cent of a population of almost 100,000 were infected in 1923 remains completely clear a result now maintained for more than 5 years.

Province of Coetymannville Among 518,210 persons examined 1,352 new infections were found, giving an index of new infection of 0.26 per cent. On Lake Edward the favourable results now permit the reopening of fisheries and the reoccupation of pastures, under medical supervision and with the aid of drug control. In the Ruzizi valley and on Lake Tanganyika where movement of natives is now freely permitted the endemic is still receding. In Maniema the large areas of infection remain confined along the Lualaba and the Kongo-Kindu railway.

Province of Elisabethville Among 350 733 persons examined 1 030 new infections were found giving an index of new infection of 0.29 per cent. An increase in endemicity is recorded on the Lualaba principally at Kongolo Mukula Kulu. On the other hand improvement is reported on Lake Tanganyika. The Kongolo focus is a prolongation of the large endemic area from the Lualaba to Manlema and is favoured by the floating population and the recruitment of native labour. On Lake Tanganyika endemicity is maintained in fishermen and the prophylactic use of Bayer 205 in professional fishermen is suggested.

F Murgatroyd

JACK (R. W.) *Further Studies in the Physiology and Behaviour of Glossina morsitans Westw.—Mem. Dept. Agric. S. Rhodesia* Salisbury 1941 No 3 [4] + 56 pp. With 6 charts. [Summary taken from *Rev. Applied Entom.* Ser. B 1942. Aug. Vol 30 Pt 8 pp 115-117.]

This paper comprises records collected on the eco-climate of various situations in the Chipene area of Southern Rhodesia in which *Glossina morsitans* Westw. occurs and the results of observations on the bionomics of the fly in the field made by W. L. WILLIAMS. The observations were planned as an extension of the author's laboratory research. The eco-climatic records were collected from July to November 1938 in six situations of which two were in evergreen river forest, two in savannah forest, one in open country at an altitude of 3 000 ft. and one in open country at an altitude of 1 400 ft. in the Zambezi valley. The findings at this last named station show that the evaporation rate is very high during the latter part of the dry season. There were nine days on which the temperature in the screen rose to 104° F. or over whilst on four days it rose to 106° F. or over.

It is considered evident that in many localities cooler refuges than those afforded by simple shade must be essential for *G. morsitans* during the latter half of the dry season, and it is suspected that in exceptionally hot periods the fly might suffer a severe setback. Records obtained at the other stations showed that flies in the shelter of certain kinds of riverine forest are exposed to a much lower evaporation rate than is apparent from standard meteorological records.

The following is based on the author's summary of data obtained in the course of the observations on bionomics. They showed a great variation in the weight of blood ingested at a meal by flies of the same sex whether they were wild flies or unfed reared ones offered food on the day after emergence. There was also great variation of weight among flies caught at the same interval after feeding and it is considered that the weight of a fly has relatively little value in indicating the period that has elapsed since its last meal. A meal caused a marked depression in the water ratio (percentage of water to wet weight less fat) on the day after feeding followed by a rise and then a gradual decline if another meal was not obtained. The weight of fat in wild flies caught at the same interval after a meal was very variable. The percentage of wild flies recaptured after being fed and released was much higher in both sexes than the percentage of bred flies recaptured after being fed once on the day after emergence and then released. Flies taken on the higher veldt had on an average a higher water ratio than flies taken in the Zambezi Valley. The males caught in the valley had a lower mean fat content than those taken on

the higher veldt although the contact between game and fly is judged to have been greater in the valley. When young flies were excluded, the water ratio in females caught on moving man was lower than that in the males. Following a week of excessively hot, dry weather in the valley flies of both sexes taken on cars and on man had a very low water ratio and were very reluctant to leave the shade. Unfed flies with a low fat content (under 0.5 mg) had a significantly lower average water ratio than unfed flies with a higher fat content particularly at the higher altitude. Flies with a water ratio of 73 per cent. and over were shown to be either unfed flies not long emerged, flies that unbibed blood at the time of capture or flies with a considerable fat reserve. Fed males with a fat content of under 1 mg. had, on an average, significantly lower water ratios than those with a higher fat content. Individual analyses of old flies of both sexes caught on the higher veldt and having a water ratio of 67.2 per cent. or less and comparison with controls with a similar weight of non-fatty solids showed that the flies were definitely short of water the fat content being also generally low and it is concluded that at the time of year concerned, flies maintain their water content by metabolism of fat as long as a considerable reserve of this remains but that loss of water becomes more rapid than production as the fat reserve diminishes. Data on the accumulation of non-fatty solids are presented. The nature of these solids requires investigation. They outlast the fat during starvation. The result are also given of observations on the percentages of young males and young females to the total catch of the same sex on different attractants.

A table is given showing the weights of wild pupae collected weekly in the field the percentage parasitised (average 4.1) and the percentage that produced adults (average 77). Whilst the lowest percentage of emergence 561 was obtained from pupae collected at the end of the hottest and driest week of the period, it is considered questionable whether this was due to the conditions to which the pupae had been exposed. Comparison between the weights of pupae bred in the laboratory and of others collected in nature suggest that by proper feeding of the females at a suitable temperature (e.g. 24°C. [75.2°F]) pupae can be obtained in the laboratory that are as heavy as the average wild ones. A correction to a previous paper which has already been noticed, is appended.

ZIEGLER (F) Die Tsetsefliegen und ihre Bekämpfung. [Tsetse Flies and their Control. — *Deuts. Trop. Zeitschr.* 1941 Feb 15 Vol. 45, No. 4 pp 118-124 With 3 figs. (1 map)]

KUNERT (H) Die Einwirkung von intravenösen und peroralen Gaben von Bayer 205 auf *Trypanosoma rhodesense* im Liquor cerebrospinalis. The Action of Bayer 205 Given Intravenously and by the Mouth in *T. rhodesense* Infection of the Cerebrospinal Fluid. — *Zent. j. Bakt.* 1 Abt. Orig. 1942, Feb 16 Vol 148 No 6 pp 279-289 12 refs

The remarkable action of Bayer 205 in first stage cases of sleeping sickness is common knowledge and there is also little doubt that the drug can certainly cure cases in which the cerebrospinal fluid has only recently become involved. The varying number of trypanosomes in

the spinal fluid in late cases makes it difficult to form an estimate of the action of Bayer 205 in such patients. The parasites may disappear from the spinal fluid for a longer or shorter period after treatment but this may also happen in untreated cases. The fact that late stage cases may not be cured either with Bayer 205 or with a combination of this drug and other compounds raises the question whether the concentration of the drug reaching the cerebrospinal fluid is not very much less than in the blood and thus insufficient to exert a trypanocidal action.

The author has attempted in a series of cases of sleeping sickness in Tanganyika to raise the concentration of the drug in the blood by intravenous injection at short intervals of 3.0 gm. of Bayer 205 hoping thereby so to increase the concentration in the cerebrospinal fluid as to cure the disease. Details are given of 11 cases treated, some of them received a preliminary dose of 3.0 gm. by the mouth and then doses of 3.0 gm. were given intravenously at approximately 5-day intervals.

Another series of experiments was undertaken to ascertain the concentration of Bayer 205 in the serum and in the cerebrospinal fluid of sleeping sickness patients on the 1st 2nd 3rd 4th and 5th days after a 3-gm. dose intravenously and by the mouth respectively. It was found that with either method of administration the drug reached the spinal fluid. The content in the serum was two or three times as great as in the spinal fluid after intravenous injection and about 4 times as great after oral administration. The figures obtained are given in tables.

The following are the conclusions —

The unsuccessful treatment of late stage cases of *T. rhodesense* sleeping sickness is reported. Large doses of Bayer 205 (3 doses of 3.0 gm. at 5-day intervals) produced only a temporary action on the trypanosomes. Apparently the relapse in the cerebrospinal fluid must be due to drug resistant trypanosomes. Decrease in the cell count of the cerebrospinal fluid, or the absence of trypanosomes does not imply cure. On the contrary however an increase in cell count is always a sign of relapse. The trypanosomes usually reappear some months later in the spinal fluid. A satisfactory demonstration that the fluid is free from trypanosomes can be made only by centrifugation and examination of the deposit.

Bayer 205 when given in a 3-gm. dose by the mouth does not make the spinal fluid negative earlier than 48 hours after administration and may not do so for 72 hours. After 6 days the parasites are again visible in the fluid. Chemical analysis confirms the clinical observations that Bayer 205 reaches the spinal fluid after oral administration. The place from which the trypanosomes reach the spinal fluid is considered and the conclusion is reached that they do so from the tissue of the choroidal plexus.

W Yorks

FRIEDHEIM (Ernst A. H.) L'acide triazine-arsinique dans le traitement de la maladie du sommeil. [Triazine-Arsinic Acid in the Treatment of Sleeping Sickness]—*Ann Inst Pasteur* 1940 Aug Vol 65 No 2 pp 108-118

This paper is the same as that abstracted in this *Bulletin* 1941 Vol 38 p 634

(1942)

C 17

B2

OTÁLORA (Benjamin) Enfermedades de Chagas en Colombia. [Chagas's Disease in Colombia.]—*Med y Cirugia* Bogota 1942. Feb Vol. 6 No 6 pp 253-5 257-63 285-8

This paper giving an account of the first cases of Chagas's disease found in Colombia was read before the Society of Pediatrics. Knowledge of the existence of the disease in Colombia dates from Dr PIEDRAHITA's finding of infected *Rhodnius prolixus* in 1929. The author himself has examined children from various districts where this insect is common and though blood smear did not reveal trypanosomes, xenodiagnostic method proved 13 to be positive out of 512 (2.5 per cent). Those infected belonged to the poorer families living in grass-roofed huts infested with *Rhodnius*. For epidemiological purposes the author urges a more extensive examination of the local Reduviidae and of the animal to find out which are reservoirs of the trypanosome.

H Harold Scott

MAZZA Salvador Die Behandlung der akuten Chagas-Krankheit mit "Bayer 7602" (Ac) [Treatment of Acute Cases of Chagas's Disease with 7602 (Ac) "Bayer"]—*Dtsch Trop Ztschr* 1941 Oct 1 Vol 45 No 19 pp 577-590 With 3 figs [17 refs.]

This is an interesting account by Professor Mazza of the results of his work with Bayer "602" on Chagas's disease. It does not it is true contain much that is new or is not already known to readers of this Bulletin but it constitutes an excellent summary of experimental work with the drug and the subsequent application of it in human cases of the disease. The author starts with a note on the history of the drug. In 1937 he states the author and thus is the date of the reference given in the bibliography but later on he says that in 1936 he obtained the drug in a new form, a 3 per cent solution for testing. H JFASCH working on substitution products in the quinolin ring prepared a compound by union of two aminomethyl-pyrimidin groups with one dithymalonyl group which seemed to have a specific action on *T. cruzi* though inactive on other trypanosomes. It was designated Bayer "602" (Ac) and it was sent to Prof Mazza for purposes of research.

He started his test with infected dog. Details of five are given the upshot of them is that injected in doses of 30-50 mgm per kgm body weight "602" caused the trypanosomes to disappear from the circulating blood. The action is not a direct but an indirect one in the tissues destroying the forms which pass out into the circulation, and so preventing accumulation of the parasite in other organs. He next made trial of the drug in naturally infected armadillos (*Charophraactus ferellensis panamensis*) and then in mice.

He now felt justified in trying the effect in human cases of the disease and for this purpose used a 3 per cent solution for intramuscular injection. A child of 3½ months, weighing 6.5 kgm was given 0.25 0.5 and three injections of 1.0 cc altogether 3.75 cc or 18 mgm per kgm body weight. After the second dose (i.e. after 22.5 mgm or only 3 mgm per kgm) no trypanosomes could be seen in a blood smear whereas before the beginning of treatment 300 could be found in a thick drop. Three months later however xenodiagnostic methods showed that infection was still present 30 per cent of *Triatoma infestans* larvae being infected. Obviously the dose used had been insufficient.

Professor Mazza then treated 37 patients in the first stage of the acute disease keeping the dose low enough to avoid albuminuria or other signs of renal mischief and then 25 more using the 3 per cent solution ready prepared. The trypanosomes disappeared from the circulation within 48 hours. Intravenous injection caused sweating and praecordial pain and distress.

A new form of the drug was then made available—ampoules containing 0.15 gm. of the dried substance for making a 3 per cent solution by dissolving in 5 cc. With this, pain at the site of injection was less. The dosage of this was at least 30 mgm. per kgm. body weight but three or even four times this was tolerated. Some details of 17 cases are given in which the doses varied from under 30 mgm. to 120 mgm. per kgm. The higher doses were needed for patients with symptoms of meningo-encephalitis. The doses must be given without rest periods unless albuminuria is produced.

Antimonials such as neo- or solustibosan given with a view to eliminating leishmanial forms in the tissues possess no advantage over 7602 in proper doses whether given before or after the 7602. By proper or adequate doses the author means 100–120 mgm. per kgm. for small children, 60–90 mgm. for older children and 30–60 mgm. for adults (per kgm. body weight). These refer to acute stages first or second. For those in the third stage with myocardial and nervous symptoms the author is not dealing in this article.

H. Harold Scott

FEVERS OF THE TYPHUS GROUP

MEDICAL RESEARCH COUNCIL. *Monthly Bull. Emergency Public Health Lab. Service* 1942 Aug pp 6–9 (Not for sale)—
The Well-Felix Reaction of "Normal" Sera.

This report is of great interest and importance.

The agglutinin content of 100 normal sera for *Proteus* OX19, OXA and OXK was tested. Twenty-five of the sera were from healthy Italian prisoners of war; the rest were from persons whose blood had been sent for examination in connexion with syphilis, gonorrhoea, pyrexia of unknown origin and Sonne dysentery. The test was made with concentrated suspensions from the Standards Laboratory, Oxford, and account was taken only of standard agglutination. The results obtained in the healthy prisoners of war were not significantly different from those in the other cases so that the following combined table can be regarded as giving a fair index of the responses obtained in persons who have not been exposed to the risk of louse-borne or flea-borne typhus.

The high proportion of sera which agglutinate *Proteus* OXA is striking. Stress is laid on the need for investigation of sera from persons from whom strains of *Proteus* have been isolated. [Presumably

TABLE I

Result of *Well-Felix* test on sera from 100 normal subjects

(Combined results on Groups 1, 2, 3 and 4)

Suspension	Time of reading	No agglutination at 18 or over	No of sera showing Standard agglutination at 50°C in a dilution of					Percentage showing agglutinin titre not higher than 1/16
			1/8	1/16	1/32	1/64	1/128	
<i>Proteus</i> OX19	4 hrs	58	19	17	5	1	0	94
<i>Proteus</i> OX2	4 hrs	39	20	22	18	2	1	81
<i>Proteus</i> OXA	4 hrs	51	29	12	8	0	0	92
	4 hrs	33	27	21	17	2	0	81
	4 hrs	1	0	30	60	7	2	31
	4 hrs	0	0	15	69	13	3	15

because the organism in these cases would be likely to cause the development of agglutinins and so introduce a possible fallacy in diagnosis.

In Britain louse borne and flea borne typhus are the only fevers of the typhus group that are likely to need consideration so that sera need only be tested against *Proteus* OX19 which is not likely to agglutinate in titres higher than 1-64 after four hours incubation at 50°C except in cases of typhus infection. It is stated that agglutination appears in positive cases at the end of the first week, so repeated examination is advisable if the first sample of blood is taken early during illness or if the titre is not more than 1-64.

John H. D. McGee

DAVIES (Gustave J.) & BILLINGS (F. Tremaine) Jr. The Well-Felix Reaction in Patients with *Proteus* and *Pseudomonas aeruginosa* Infections.—*Jl Immunology* 1942 July Vol 44 No 3 pp 251-258 (11 refs.)

The sera of persons infected with *Proteus mirabilis*, *P. vulgaris* or *Pseudomonas aeruginosa* usually contain a minor antigen which, on the average agglutinates *Proteus* OXA in high titre, *P. OX2* in lower titre and *P. OX19* in still lower titre.

It is not to be implied that the organisms cultured were in each case assumed to have played a major rôle in causing or determining the course of the patient's illness.

The investigation dealt with 14 cases. *Proteus mirabilis* was isolated from 12 patients usually from the urine and usually in infections of the urinary tract. From one of these patients *Ps. aeruginosa* was also isolated. *P. vulgaris* was isolated from two patients, one of whom had an abscess and the other an infected wound.

Details are given of the agglutination reactions in all the 14 cases the following are a few examples —

Diagnosis	Cultures	Titre of Agglutination			Patient's organism
		<i>Proteus</i> OX19	P OX2	P OXA	
Abscesses	<i>P. vulgaris</i>	1-40	1-320	1-640	1-640
Urinary tract infection	<i>P. mirabilis</i> (from urine)	0	0	1-80	0
Do	Do	1-80	1-80	1-640	1-160
Do	Do	1-20	1-20	1-640	1-80
Do	Do	1-160	1-6 000	1-2,560	1-320

Only those patients who developed appreciable agglutinative titres to their own organisms showed agglutinins in significant titres for the Weil Felix antigens. Of ten sera which agglutinated the homologous organism in titres of 1-80 and over nine agglutinated *Proteus* OXK three agglutinated OX2 and three OX19 in similar dilutions. The general response of the positive sera was a moderately low titre for OX19 a higher titre for OX2 and a still higher titre for OXK.

The general pattern of the response as compared with that observed in various types of typhus fevers is as follows —

	<i>Proteus</i> OX19	Pr OX2	Pr OXA
Typhus fever	++++	+	+
Rocky Mountain spotted fever	+++	+++	+
Tsutsugamushi	+	+	++++
<i>Proteus</i> or <i>Pseudomonas</i> infections	+	++	+++

It will be seen that the general pattern of the response to *Proteus* infections approaches to that of mite borne typhus.

Sera from three cases of typhus and from one of Rocky Mountain spotted fever were tested for agglutination with the strains isolated from the cases of *Proteus* infection there was no response in a titre higher than 1-20.

[This important article must be consulted in original form by workers on the serology of the fevers of the typhus group the summary gives only the broad outlines of the investigation. Evidently infections with *Proteus mirabilis* are by no means rare and they are likely to give rise to high titre agglutination of *Proteus* OXK false positives with OX2 are less likely to occur and fortunately OX19 is seldom agglutinated in significantly high titres.] *John W D Megaw*

MUHLENS (P) Die Bedeutung des Fleckfiebers für Afrika. [Typhus in Africa.]—*Deut Trop Ztschr* 1941 Apr 15 Vol 45 No 8 pp 248-256

This is a useful summary of the geographical distribution of fevers of the typhus group in Africa. Muhlens includes a table of classification of the usual kind. Extensive outbreaks of epidemic louse-borne typhus have been recorded since 1931 in Algeria Morocco (especially

Marrakesh and Casablanca) Tunis and Egypt. In Cyrenaica there was no record of widespread typhus in this period. It is known in Eritrea and Uganda. In 1934 there was an epidemic in Urundi and cases have been reported, in smaller numbers from Kenya and Tanganyika. In West Africa the disease is rare. In South Africa however it is a serious problem. In 1921 there were many thousands of cases in Ciskei and Transkei and in 1934-35 even more were reported from Basutoland and the Orange Free State. South West Africa is also infected.

The murine flea borne form is found in North Africa, the Belgian Congo, Freetown, Dakar and in South Africa. Tick-borne typhus is present in the Mediterranean countries, French Equatorial Africa, the Congo and in South Africa (Swaziland and Transvaal especially). The mite-borne form is not known in Africa.

Since this paper was written louse-borne typhus has spread in severe epidemic form in Morocco, Algeria and Tunis.

C II

DORMANN (E) & EMMINGER (E): Fleckfieber Übertragung von Mensch zu Mensch durch Bluttransfusion im Inkubationsstadium. Transmission of Typhus Fever from Man to Man by Blood Transfusion in the Incubation Period. — *Menschl. Med. Woch.* 1942, June 19, Vol. 89, No. 25, pp. 559-561. With 3 figs.

An attack of typhus fever fatal on the 5th day followed the transfusion of 250 cc. blood from a donor who was found later to have been in the incubation stage of an attack of typhus about three days before the onset. The incubation period of the disease in the recipient of the blood was 11 days. The fatal result was largely due to his extremely debilitated condition which resulted from a severe gunshot wound of the leg which had to be amputated eleven days before the transfusion and after five weeks of conservative treatment. The attack differed in no way from what would have been expected if the disease had been transmitted by lice. The Weil-Felix titre was 1-400 in blood taken after death and typical granulomatous nodules were found in sections of the medulla oblongata.

J. H. H. D. Meigs

LAMPERT: Der zerebrale und der intestinale Fleckfiebertyp (Cerebral and Intestinal Types of Typhus Fever). — *Dtsch. Med. Woch.* 1942, May 22, Vol. 68, No. 21, pp. 521-528. With 4 charts.

This article deals with 221 cases of typhus fever treated at a war hospital in Ostrow, Poland, between 9th November 1941 and 1st March, 1942. The cases fall into two distinct groups which are discussed separately. In the first group 117 cases occurred up to 4th January 1942, all are classified as being of the cerebral type. The patients were guards of prisoner-of-war camps in the district and the attacks occurred in spite of delousing and of standing orders that close contact with the prisoner must be avoided. The case were typical of those seen in virulent epidemics, the total fatality rate being 25.4 per cent. If the 35 patients who had been inoculated more than three days before the onset were excluded it was 35.3 per cent in the remaining 82. It ranged from nil in patients under 25 to over 50 per cent in those over 50.

In two patients there was neither fever nor rash, but the Weil-Felix reaction was positive at a titre of 1-1000. The rash was pronounced in all but three. In three undoubted cases the Weil-Felix reaction was negative throughout the illness though in one of these

the dry blood agglutination test was positive. Albuminuria with a few cylindrical casts occurred in many cases. The Weil-Felix reaction was of no significance in prognosis. In one fatal case the titre was only 1-100 in another it was 1-25 000. Except for one alcoholic patient aged 54 who had only one dose of vaccine two days before the onset there were no deaths among the 35 inoculated persons although five of them had received only a single dose four or five days before the onset. The age distribution of the inoculated did not differ significantly from that of the others and the exposure to risk of infection seems to have been much the same in both groups. [Unfortunately the kind of vaccine used is not stated. It must have been either Weigl's or Cox's because these are the two types that have been prepared in Germany. The failure of killed vaccine to prevent attacks in the presence of virulent infection and its power to modify the severity of the attacks is in agreement with the experience of workers on Rocky Mountain spotted fever.]

The second group of cases was of a very different kind. 104 persons, none of whom was inoculated, were attacked between 4th January and 1st February 1942. They are classed as intestinal (59 patients) and mixed types (45 patients) the latter being said somewhat to resemble the cerebral type. No reason is given for using the name intestinal rather than mild. Most of the patients were soldiers who had just returned from the eastern front and they must have been infected on the journey. Some of them were suffering from wounds or frost-bite. There were no deaths and the course of the illness was on the whole mild. The temperature ranged about 39 C and the fever lasted 10 to 14 days. The clinical course often resembled influenza, and the rash was often very sparse and fleeting. The incubation period was usually 14 to 21 days.

The author states that it is an open question whether the mildness of the attacks was due to infection of low virulence or to the treatment which was systematically carried out from the 1st January 1942, having been gradually evolved during the previous two months.

The thorough nature of the treatment can be judged by the statement that more than 2 500 hot baths were given, more than 40 000 cc. of kunstblut (a proprietary preparation of artificial blood consisting of a solution of haematin and gelatine) and more than 200 000 cc. of Ringer's solution were given by intravenous infusion. More than 80 intravenous transfusions of fresh whole blood from convalescents were carried out. Some confusion is caused by a conflicting statement in another part of the text where it is remarked that subcutaneous injections of Ringer's solution were given because of the danger of too sudden a dilution of the blood by intravenous injections. The theoretical considerations on which the above methods of treatment were based are discussed at length. No special drugs were given.

[The author will not find many supporters for his view that the treatment may have been responsible for the relative mildness of the attacks in the second group of cases. The long incubation period which could not have been influenced by treatment suggests that an infection of low virulence was contracted from persons living in endemic areas and suffering from mild attacks. The great severity of the cases in the first group equally suggests the existence of highly virulent epidemics in the prison camps where the patients became infected. Nothing is said about the conditions prevailing in these camps.]

John H. D. McGraw

WOHLRAB (Rudolf) Chemo- und Serotherapieversuche an Fleck typhuskranken [Investigation of the Chemo- and Sero-Therapy of Typhus Fever]—*Ärztl. Woch.* 1942. May 16 Vol. 21 No. 20 p. 455

Several sulphonamide drugs had previously been tested but the results were not convincing. In the present trials a new sulphonamide called Bo 1034 was used. In one group of cases, treated between July and October 1941 the duration of the fever was reduced on the average by 2.8 days as compared with 31 untreated controls, but in another group of 21 cases treated in November and December 1941 when the severity of the disease was greater the average duration was reduced by only one day and no clinical benefit was observed. Severe vomiting and sometimes also diarrhoea occurred, the case fatality rate was not reduced and complications were not prevented.

Sulphapyridine (eubasium) is referred to as having no obvious effect except possibly in connexion with pulmonary complications.

Convalescent serum and animal immune sera were regarded as being of no great value either as a preventive or curative treatment.

John W. D. Megaw

REICHSGESUNDHEITSBLATT 1942 Mar 4 Vol 17 -p 160—
Instructions for the Campaign against Typhus. Circular of the Reich Minister of the Interior dated 13th February 1942.
[Translation 14 typed pp.]

This circular replaces and supercedes a number of separate orders and instructions which have been issued from time to time. It consists of three parts: one contains instructions for delousing and disinfecting; another gives advice to doctors, and the third tells the general public what they ought to know about the disease.

The first part follows the usual lines for the most part but there are some points of interest. Reference is made to the protective inoculation of medical, sanitary and nursing personnel: it is stated that the vaccine can be obtained from the Robert Koch Institute Berlin, the Institute for Experimental Therapy Frankfurt-on-Main and the Behring Works. Model plans are available for disinfecting and delousing stations. Experiments are now being made with a type of hot-air disinfecting station consisting of a chamber heated from the sides and arranged so as to allow of complete separation of the clean from the dirty side. The State Building Department is urged to press on with the provision of delousing posts and to help local bodies in their efforts in the same direction especially in the few districts where stations have not yet been erected.

Although destruction of lice is the essential matter it should, when practicable be combined with disinfection because of the possible risk of infection by the excreta of lice in which the virus can survive after disinfection with cyanide gas. Formaldehyde in the strength usually employed does not kill lice.

The life-cycle and biology of the body louse are described in some detail. It is held that a knowledge of these is essential for success in delousing. Larval lice can survive for a week without food; adult lice for not more than a week to ten days, but the eggs can remain viable for several weeks at low temperatures.

Lice and nits may be found on floors, walls and furniture, but only in exceptional cases of very heavy infestation. In such cases repeated

disinfestation is needed. For combined delousing and disinfection a mixture of equal parts of water and a 5.0 per cent cresol-soap solution having a cresol content of 2.5 per cent is recommended, or carbolic acid 1 in 20 can be used. In delousing infested persons the sites most favoured by lice should be vigorously rubbed with paraffin [presumably kerosene] for two minutes then lathered with soft soap which is washed off after ten minutes.

The second part intended for doctors gives a general account of typhus fever on text book lines. The doctor who visits a known or suspected case is advised to take off his overcoat and put on a gown of smooth material covering the trunk and arms and fastening tightly at the wrists. Apart from this the chief point emphasized is that the bed clothes of the patient must be pulled back carefully and not thrown off lest the lice should be scattered over persons standing by the bed. Protective inoculation is advised the vaccine is described as being made either from the intestines of infected lice or from cultures grown in the germinal membrane of fertile hens eggs. No mention is made of the originators of these methods perhaps because WEIGL is a Polish worker and COX an American. The inoculated persons are not fully protected and must continue to take the usual precautions. The reaction is similar to that resulting from enteric inoculation but is less severe. Vaccination must be renewed every year. Emphasis is laid on the employment of attendants who have had attacks of typhus fever but no mention is made of the importance of selecting youthful persons. In the section on treatment it is stated that there is no specific drug the importance of watching the circulatory system and of supporting it with camphor and injections of cardiazol is emphasized. Convalescent serum is mentioned in terms of very faint praise. Cold water treatment and ice bags to the head and praecordium are said to be valuable.

When cases occur preventive delousing of the whole population in the neighbourhood is advised. Suspects need only be deloused thorough disinfection is not needed.

The third part gives a clear and simple account of the disease for the instruction of the general public.

[The circular as a whole is rather confusing there are frequent repetitions which suggest that the material has been brought together from a number of different sources.]

John W D Megaw

HEILIG (Robert) & NAIDU (V R.) *Further Experiences on Endemic Typhus in Mysore*—*Indian Med Gaz* 1942 June Vol 77 No 6 pp 338-342 With 10 figs. (8 on 2 plates)

Fourteen cases of one of the fevers of the typhus group are discussed these include four cases already described by the authors [see thus *Bulletin* 1942 Vol 39 p 375] and diagnosed as endemic tropical typhus. Ten of the patients lived in Mysore city the other four came from large villages in the State. Four cases occurred in August two in September and one in each of the months October to February. There were no cases in the hot months March to July. The cases were sporadic only in one instance did two cases occur in the same house. The fever lasted 16 to 21 days the rash was conspicuous it was maculo-papular and extended to the face in six cases the palms and soles were affected. Staining at the sites of the spots persisted for weeks or months and was even more conspicuous in the third and fourth weeks than the rash had been.

In all the previous four cases the Weil Felix reaction was completely negative it was also negative in one of the later series almost negative in another but in all the remaining six cases in which it was tested the results were positive as is shown in the table —

Day of Fever			Proteus OX19	Pr OXR	Pr OX2
12	--	--	1-40	1-40	1-320
21			1-320	1-320	1-90
10		--	1-40	1-40	1-640
{ 13			1-160	1-20	1-1,280
{ 22			1-160	1-40	1-160
{ 9			1-80	1-20	1-160
{ 21			1-80	1-40	1-640
{ 35			0	0	0

Blood from one of the patients previously reported had caused a scrotal reaction in guinea-pigs but in four of the other cases that were tested the results were negative. There was no house infestation in any case and no history of bites by ticks or mites could be obtained. All the patients lived in extremely close contact with rats and most of them in equally close contact with tick infested cattle.

Fleas collected from two rats caught near one patient's house were inoculated into guinea-pigs, which developed fever and reacted to Pr OX2 +1-160. Fleas from rats trapped in two other patients' houses gave negative results. Fifty ticks from cattle belonging to two patients were emulsified and injected into guinea-pigs with negative results.

Although the chief vector is *Amblyomma cajennense* the bed bug may perhaps be capable of transmitting infection in natural conditions. Bugs collected from the beds of patients have caused the disease in inoculated guineapigs in some cases. In one case laboratory bred bugs were fed on a patient and afterwards transmitted infection to *rhesus* monkeys by their bites. Later experiments were negative and PARKER failed to transmit the similar disease in São Paulo by bed bugs. The typhus fever of Minas Geraes persists in certain localities though these may remain quiescent for several years. In one large area where the disease has persisted for a long time there is a zone in which cases have never been seen probably because periodical burning of the grass destroys the ticks, drives out the reservoir wild animals and makes the place unsuitable for grazing. In this zone there are huts in which a few bugs and ticks exist and dogs are fairly numerous.

Wild animals may bring the Rickettsiac to suburban areas alternatively domestic animals may bring infected ticks into the houses. The latter suggestion is favoured by the fact that ill fed dogs often share their owners beds. Dogs as well as human beings are regarded as being only transitory and accidental reservoirs of infection. In

dozens of cases ticks collected from infected persons were found to be infective to animals by immediate or late inoculation. By actual tests the author has excluded mosquitoes, fleas, lice and *Boophilus microplus* [presumably *B. annulatus* var *microplus* Neumann 1901] from the rôle of possible vectors. There are probably many natural reservoirs of infection including dogs, domestic and wild cats, foxes, opossums, squirrels, the coati, the capybara and other wild rodents. Wild and house rats have never been found infected.

Quiescence of the disease in known foci is probably explained by the immunity acquired by residents through previous attacks which may have been mild. Of 111 cases observed 23 were in females and 88 in males. Persons of all ages are equally susceptible.

By experimental tests in the laboratory it was found that the ticks must remain fixed on the host for 36 hours or more otherwise transmission does not occur.

[It does not seem safe to count on so long a period in natural conditions. No mention is made of the reactivation of the virus by a preliminary blood feed. Reactivation might considerably reduce the time needed for transmission and the necessity for reactivation may account for the small proportion of cases in which natural infection results from tick bites in heavily infested areas. Natural transmission by bed-bugs can hardly be important in view of the strictly local distribution of the infection as opposed to the universal distribution of the bed bug.]

John B. D. Megaw

BRUMPT (E.) & DESPORTES (C.) Grande longévité du virus de la fièvre pourprée des Montagnes Rocheuses et de celui du typhus de São Paulo chez *Ornithodoros turicata*. [Prolonged Survival of the Viruses of Rocky Mountain Spotted Fever and the Typhus of São Paulo in *Ornithodoros turicata*.]—*Ann. Parasit. Humaine et Comparée* 1941 Vol 18 Nos. 4-5-6 pp 145-153 With 4 figs.

Suspensions of the tissues of 4 *O. turicata* infected with the virus of Rocky Mountain spotted fever 4 years, 6 months and 16 days previously were found to be infective to guineapigs causing typical

febrile and orchitic reaction. In similar conditions the virus of the typhus of São Paulo survived for nearly 5 years the reaction in guinea-pigs in this case was mild and produced only a certain degree of immunity.

With both viruses some lots of infected ticks kept for the same length of time were found to be non-infective. It was not possible to estimate the percentage of ticks in which the virus survived for these long periods. The virus of neither of these diseases could be transmitted by the bites of *O. turicata* even when the site was soiled with coral fluid and excreta.

The authors find it difficult to express an opinion about the epidemiological significance of their experiments. Adult *O. turicata* are too tough to be crushed on the human skin in such a way as to cause infection but nymphs are more delicate and so may eventually play a part in transmission. The ingestion by guinea-pigs of *O. turicata* infected with the virus of Rocky Mountain fever did not cause infection so it appears that this species of tick cannot be regarded as a source of infection in this way.

PERRIN (Theodore L.) & BENGTSON (Ida A.) The Histopathology of Experimental "Q" Fever in Mice.—*Public Health Rep.* 1942. Mar 22 Vol 57 No 21 pp 790-798 With 8 figs. on 2 plates.

A detailed account, illustrated with good photomicrographs, is given of the histological changes found in young Swiss mice at varying periods after intranasal and intraperitoneal inoculation with yolk-sac cultures of the Rickettsiae of Q fever. Nodular and patchy granulomata, composed chiefly of large mononuclear cells, were found in the spleen, liver, kidneys and adrenals of most of the animal. In 52 of 54 mice inoculated by the intranasal route there was an early pneumonic reaction with proliferative changes. A point of great importance is that pneumonia occurred also in 8 of 20 control mice inoculated intranasally with normal yolk sac material. The reaction was different being more exudative than proliferative and polymorphonuclear cells predominated in the exudate.

The production of pneumonia in the lungs of mice inoculated intranasally with Rickettsiae is therefore not in itself evidence of the presence of the virus in the material employed. The report will appeal specially to workers on Rickettsial diseases. It gives a clear statement of the technique employed.

GEAR (James) HARRIS (L. C.) & SAUER (R. G.) Anti-Typhus Vaccine from Guinea-pigs with Vaccine Prepared from Infected Gerbils.—*Trans Roy Soc Trop Med & Hyg.* 1942 Aug 31 Vol 36 No. 2. pp 80-88.

In a previous communication GEAR and DAVIS [this Bulletin 1942, Vol 39 p 750] showed that the gerbils of South Africa after preliminary exposure to Δ rays, were susceptible to the virus of epidemic typhus murine typhus, and tick-bite fever. In many cases there were profuse growths of Rickettsiae after intraperitoneal inoculation. Vaccines have now been prepared by the Zimser-Castaneda method. The exposure to Δ rays was for 15 minutes, the total dose being 600 R. One cc. of a suspension—prepared by emulsifying in 15 cc. saline the brain of a guinea-pig killed on the 3rd day of fever resulting from

inoculation with *R. prowazeki*—was inoculated into the peritoneum of a gerbil the animal was kept in a room at 70° to 80°F. After an incubation period of 5 to 10 days the animal usually became ill and was moribund within a day or two of the onset.

The peritoneal cavity was first scraped with a blunted and slightly roughened scalpel and then washed out with 0.2 per cent formal saline. From 20 to 40 cc. of suspension containing Rickettsiae and cells, were obtained from each animal. By differential centrifugation a deposit of Rickettsiae was obtained. This was made up with 0.1 per cent formal saline to an opacity corresponding to 1 000 million *Bact. coli* per cc. Details are given of the technique employed.

Six young guinea-pigs were given three doses of 1.0 cc. each of the suspension at weekly intervals. After a month the animals were found to be immune against large doses of the virus. Five control animals inoculated with the same infecting doses and four inoculated with one-tenth of these doses were all susceptible. So were three of five animals inoculated with 1/100 of these doses.

Several hundred gerbils have been sent to the South African Institute for Medical Research where the vaccine is now being prepared on a large scale.

Nine laboratory workers have been vaccinated with four doses of 1.0 cc. each at weekly intervals. Slight local reactions less than those with T.A.B. vaccine followed in eight persons. In the ninth there was a history of allergy and a severe local reaction resulted from the second dose. The later doses were given intradermally and the reactions were much less. There were no general reactions except that one of the inoculated had slight headache on the day following the second injection.

John H. D. Megaw

BARTONELLOSIS

HERTIG (Marshall). Phlebotomus and Carrion's Disease. I. Introduction. II. Transmission Experiments with Wild Sandflies. III. Field Studies on Phlebotomus. IV. Massive Infections of the Sandfly Proboscis with Unidentified Microorganisms.—Supplement to Amer J Trop Med 1942 July Vol 22 No 5 81 pp With 14 figs. on 3 plates.

This monograph, which is divided into four sections is a valuable summary of research work on the rôle of *Phlebotomus* in Carrion's disease accomplished during the past five years in the Instituto Nacional de Higiene y Salud Pública, of Lima, Peru, in collaboration with the Department of Comparative Pathology and Tropical Medicine of the Harvard University Medical School. Part of the data presented has already been published [this *Bulletin* 1938 Vol 35 pp 375-376 1940 Vol 37 p 853 Proc VI Pacific Sci Congress, 1939 Vol 5 pp 775-779 Proc. III International Congress for Microbiology New York 1939 pp 401-402]. In the introductory section is given an excellent historical review of entomological investigations relating to Carrion's disease and a summary of the views which have been put forward as to the method of transmission of the infection.

In Section II the author records detailed results of transmission experiments in the laboratory with wild-caught *Phlebotomus* from

endemic zones. It is pointed out that NOGUCHI and his collaborators [this *Bulletin* 1929 Vol. 26 p. 849] and BATTISTINI [this *Bulletin* 1932, Vol. 29 p. 30] showed that *Bartonella bacilliformis* could be recovered in *rhesus* monkeys from *Phlebotomus sandflies* taken in an endemic area. In addition, the latter investigator succeeded in infecting a monkey by releasing sandflies in its screened cage, though the method of infection, whether by bite or otherwise, was not determined. In the first series of experiments described in this report, three monkeys bitten by 159 out of 627 sandflies, and two monkey which were injected with suspensions of 340 or more sandflies, mostly from Verrugas Canon, did not develop the disease. In the second series of tests eight *rhesus* monkeys were exposed to the bites of wild-caught sandflies. Five of these bitten by 89 out of 447 sandflies (*P. verrucarum*) became infected with *Bartonella bacilliformis*. No skin lesions were produced. Infection was demonstrated by blood cultures, subsequent tests of such cultures in monkeys, and in two instances by immunity tests. The sandflies were placed in small feeding-cages and applied to the skin of the monkeys in such a way as to permit voluntary and natural feeding. While other mechanisms of transmission are theoretically possible the author feels reasonably certain that transmission occurred by the bites of the sandflies. Several species of South American monkeys were infected by inoculation of cultures. Nodules were produced from which *B. bacilliformis* was recovered in culture though blood cultures were negative.

The results of extensive field studies on the three species of *Phlebotomus* conducted throughout more than four years at different places and altitudes in the Rimac and Santa Eulalia Valleys, are presented in Section III. The author lays down more accurate criteria for the identification of females of *P. verrucarum* and *P. noguchii*. This matter is of importance chiefly because NOGUCHI and his colleagues produced infections in monkeys with sandflies thought to be *P. noguchii* [this *Bulletin* 1929 Vol. 26 p. 849]. It now appear that this identification was an error and that *P. verrucarum* is probably the most important transmitter to man.

In the last section of the monograph Hertig describes a curious infection of the tip of the proboscis found in both males and females of the three species of *Phlebotomus*, captured in the Peruvian verruga zone. Over 300 such infections have been observed. *B. bacilliformis* has been recovered in culture twice and an unnamed micro-organism of similar morphology about thirty times. The proportion of sandflies infected is frequently as high as 40 to 50 per cent. In many cases the pharynx is also infected. The source of the proboscis infection is unknown. Artificial feeding of *P. verrucarum* with cultures of *B. bacilliformis* has failed to produce comparable infections of the proboscis. Since the condition has been found in males which do not suck blood, and in females which have never had a blood meal, the possible relation of this infection to Carrion's disease remains obscure.

[The importance of Carrion's disease as a public health problem has been greatly emphasized by the recent discovery of the infection in Ecuador and the occurrence during the past few years of an extensive outbreak in the Department of Nariño in Colombia. There is therefore an urgent need for additional research of the careful, patient type such as that upon which this monograph is based, to furnish an adequate picture of the epidemiology of the disease.]

Hugh H. Smith

- RISTORCELLI (A.) & DAO VAN TY Phlébotomes d'une région de Colombie où la verruga du Pérou est devenue endémique depuis trois ou quatre ans [Phlebotomus in an Endemic Area of Verruga Peruana in Colombia]—*Ann Parasit Humaine et Comparée* 1941 Vol. 18 Nos. 1-2-3 & 4-5-6 pp 72-74 251-269 With 9 figs & 2 plates [12 refs]

YELLOW FEVER.

- NAUCK (E G) Die Bedeutung des Gelbfiebers für Afrika [The Importance of Yellow Fever in Africa.]—*Deut Trop Ztschr* 1941 May 1 Vol 45 No 9 pp 272-277

- TEESDALE (C) Pineapple and Banana Plants as Sources of Aedes Mosquitoes—*East African Med J* 1941 Dec. Vol. 18 No 9 pp 260-267

Mosquitoes were found breeding around Mombasa in collections of water in pineapple and banana plants. The commonest species in them was *Aedes simpsoni* but *Aedes aegypti*, *Aedes metallicus* and *Aedes pemaensis* were also found. Larval development was sometimes extremely slow [probably on account of the lack of food in the water]. The banana trees hold water throughout the year: an adult *Aedes simpsoni* emerged from a banana plant at the height of the dry season. This may help in the persistence of adults until the next rains.

V B Wigglesworth

DENGUE

- SINGH (Bhupal) Seven Days Fever (?)—*Jl Indian Med Assoc* 1942 July Vol. 11 No 10 pp 303-307 With 13 charts

In Meerut [near Delhi] a number of cases of short fever were seen during September October and November 1941. The onset was sudden with high temperature severe headache and pains all over the body but specially in the calves and back. The pulse was unusually slow in relation to the temperature and in the cases examined there was leucopenia with lymphocytosis. Some of the temperature charts showed a peculiar saddle-back type others a continued type.

The author briefly discusses the differential diagnosis between the seven day fever described in India 34 years ago and the seven day fever of Japan but expresses no definite opinion about the nature of the outbreak.

Thirteen charts are shown [With one possible exception in which the fever lasted eight days the curves are of types frequently seen in dengue and the description of the disease is in all respects in keeping with the diagnosis of dengue.]

John W D McGraw

- CHAUDHURY (L. M.) & GHOSH (S. M.) A Fever of Seven Days Duration at Patna.—*Jl Indian Med Assoc*. 1942 June Vol 11 No 9 pp 269-273 With 3 figs.

This outbreak in which 50 cases of fever lasting six or seven days were studied at the Medical College Hospital, Patna, in September (1937)

and October 1941 is clearly of the same type as the one just reviewed. The authors regard the disease as a definite clinical entity of obscure aetiology and differing from dengue in the absence of break-bone pains, rash, and division into three stages of invasion, remission and terminal fever. It differs from Japanese seven day fever in its epidemiology, the absence of glandular enlargement and leucocytosis and in the failure to isolate leptospirae from four animals inoculated with the blood of patients.

[The claim that the disease "differs from other fevers of short duration" must be scrutinized. Three fever curves are shown, two of these would serve as good illustrations of characteristic dengue curves, and the third is quite in keeping with the diagnosis of dengue. Repeated leucocyte counts were made only in one case in which the total count fell from 8,000 on the third day to 4,500 on the fifth day. The days of the disease on which the other counts were made are not specified, so that it is impossible to form an opinion about their significance: the lowest count was 3,200 in 13 cases it ranged from 4,200 to 5,000 in 11 between 8,100 and 6,000 in 11 between 6,100 and 7,000 and in 6 it was over 7,000. It exceeded 8,500 in two cases, in one of which it was 13,400 and in another 16,200, so that probably there was some complicating factor to account for these anomalous findings.]

Apart from these two cases the other counts are such as could be expected in a series of examinations made at various stages of attacks of dengue. The absence of a rash is the only feature in which the outbreak can be held to differ from the generally recognized picture of dengue, but in many outbreaks of undoubted dengue among dark-skinned persons living in places where the disease is endemic the rash has been conspicuous by its absence: even in fair-skinned persons it may occur in only 5 to 10 per cent. of the cases.

In all its other features the disease corresponds to dengue. Fifty-four per cent. of the patients were medical students or members of the staff of the hospital, blood cultures were invariably sterile, there was no evidence of infection by personal contact and there were no deaths. Body-ache is mentioned as a special feature of 19 of the cases. The authors make no reference to the seven-day fever of India, which is closely similar and which is now regarded by its sponsor to be a form of dengue. This paper and the one by SINGH are reminiscent of the controversy of more than 30 years ago in Calcutta: they show that there is still a reluctance to diagnose dengue when an outbreak does not conform in every detail to the descriptions of the classical epidemics.]

John W. D. Megaw

PLAGUE.

MEYER (A. F.) The Ecology of Plague.—*Medicine*. 1942. May Vol. 21 No. 2, pp. 143-174. [50 refs.]

Wild rodent reservoirs of plague are now in existence in 12 Western States of North America and at least one province in Canada. One of the most important discoveries with regard to plague has been the existence of rodent infection not only in the rat but also in ground squirrels. Both of these rodents may occupy the same burrows and their ectoparasites

are mutually exchangeable. Although this has been known for some time it is not always easy in practice to obtain evidence of the infection of ground squirrels. In one county for example as many as 8 000 squirrels were examined before positive infection came to light. Between 1908 and 1927 the United States Public Health Service reported 2 069 proven plague infections among some 558 706 squirrels.

Thus an animal survey catch of 30 000 rodents should produce if the disease is spread uniformly over the endemic area and occurs yearly with the same intensity an average of 15 plague infected animals. In typical plague years this figure has usually been greatly exceeded.

In California tularemia may cause extensive epizootics among rabbits and hares but it is important to know that under these circumstances only an occasional squirrel is similarly diseased. In fact

in recent years every true epizootic among squirrels was invariably proven to be caused by *P. pestis*. At first search was made for rodent plague in animals which had been shot and dissected, until it was found that pools of fleas collected even from healthy animals might prove the existence of endemic plague foci when tested on guinea pigs.

Although the ground squirrel is perhaps the most important host of sylvatic plague in California it is not by any means the only rodent thus incriminated. Plague is enzootic over at least 12 Western States and not less than 31 species of wild rodents form a reservoir of plague independent of the domestic rat. Table 3 gives a full list of these rodents. In the squirrel the plague lesions resemble more those found in the infected guinea pig than in the rat. A bubo with a purulent focus in the inguinal region is noted in about four fifths of all cases. In the acute stages the spleen is invariably very much enlarged while in the subacute form caseation or purulent lesions in liver spleen and lungs are noted. Towards the end of an epizootic period or in an enzootic area rodents with one lymph node containing small abscesses and very few bacilli are encountered. This form of infection is known as the residual type.

Much important information is now being collected by the staff of the Hooper Foundation on plague rodents and fleas. Some of this is already recorded in this work. The susceptibility to plague of a few species and of individuals of the rodent population has been tested. In all probability in the various species the range of susceptibility or acceptance of plague experimentally is not very great. On the other hand considerable difference may be found among the individuals of a given rodent population and the percentages of susceptible and resistant individuals, especially in proven and non-proven plague areas, may vary significantly. Furthermore the tests made confirm the epidemiologic fact that the susceptibility of the young immature rodents and liability of the mature males to *P. pestis* infection is much higher than that of mature females.

Flea population studies have been vigorously pursued over 50 different species have been found on the Western wild rodents (Eskey and Haas). A subject of considerable importance for sylvatic plague in the bionomics of ectoparasites is that of the influence of climatic conditions on the life and longevity of the insects. The microclimate the temperature and humidity of the burrow exert their influences on the life cycle of the flea and thus on the death rate of the insect. Certain terms relating to infection by fleas are defined. Among wild rodent fleas it is found, just as in the case

of the rat flea *Xenopsylla cheopis* that only a few of the "infected" fleas become infective." Thus we have the term "vector potential" defined as "the percentage of infected individual fleas to become infective" and again "transmission potential" as the mean number of transmissions effected by a group of infective individuals. "From the preliminary studies on three species of fleas it is recognized that neither a high infection potential, namely the acceptance and implantation of the *P. pestis* in the alimentary canal of the insect nor the vector potential alone without a consideration of the transmission potential is indicative of high vector efficiency."

The last subject treated in this article is that of rodent plague epizootics. In some countries these are very localized and foci may act as individual units without sign of spread even to other localities not more than 15 to 20 miles distant. "Focal occurrence and discontinuous distribution is apparently one of the characteristics of sylvatic plague. One of the most interesting research studies requiring intensive investigation is that of the mechanism of the persistence or perpetuation of rodent plague infection and the seasonal carry over of this infection."

This summary of an important article can only be described as sketchy—the author describes even the article itself as only a "sketchy survey of the ecology of sylvatic plague." W. F. Harvey

DOWDESWELL (R. M.) Estimation of the Value of any New Treatment in Disease with Special Reference to Plague.—*East African Med. J.* 1941 Dec Vol 18 No 9 pp 258-260

The author briefly states the arguments in favour of controlled experiment in the application of any new form of treatment or prophylaxis to man provided that there is a *prima facie* case in favour of the new method and that it is not certain that it is overwhelmingly better than the old. He quotes figures of plague case mortality rates. In Kenya from 1930 to 1937 this was 59.5 per cent of 479 patients. For the value of preventive inoculation the more important statistics up to 1936 showed fatality rates of 79 per cent in the un inoculated and 48 per cent in the inoculated. In India, WAGLE *et al* [this *Bulletin* 1941 Vol 38, p 628] recorded a case mortality rate of 21 per cent in patients with bubonic plague treated with sulphapyridine and sulphathiazole and of 43 per cent (as against 95 per cent in controls) of those with septicaemia so treated. C. W.

CHOLERA.

TAYLOR (J.) Cholera Research in India 1934-1940 under the Indian Research Fund Association. A Review—36 pp 1941 Cawnpore The Job Press

There is no doubt about the usefulness of this brochure which although entitled Cholera Research in India, deals in reality with the whole cholera problem. It has the added value that the author gives an opinion in no uncertain terms on what is cholera, whether it be sporadic or epidemic. The discussion is bound up with those most important questions: What is the true cholera vibrio? what are haemolytic vibrios? what is the El Tor vibrio, and what is the new recruit

to the choleric class the Celebes vibrio? These are questions of international interest. Emphasis has been laid on the serological identification of cholera. Evidently the project for establishing a Standard Agglutinating Serum could not be realized without more evidence procurable only by testing in the field. An obvious field for the purpose was that in which cholera was endemic and assumed epidemic form. Truly endemic cholera centres are to be found in Lower Bengal India and the Yangtse Valley China but other areas are probably endemic. It is interesting to have the basis laid down for recognition of an endemic area as (1) one in which the total number of months with absence of cholera deaths shall not exceed 30 in 32 years and (2) in which no break of 5 months or more in cholera incidence shall take place.

In the investigation of the serology of vibrios standard O antigen was used. This was prepared in dry form and testing sera were prepared for local use from this dried antigen. The two main subtypes of *V. cholerae* were used the original and variant types or as they are more commonly called the Inaba and Ogawa strains. These contain a common O antigen and in addition each contains its own specific O antigen. Strains containing all three O antigens, the 'intermediate' type were not used. Serum for testing was also prepared against an unheated suspension of a selected *V. cholerae* strain (H+O serum). A very important part of the Indian enquiry was the determination whether vibrios of serological type other than O group I could be assigned a choleric role and perhaps the most important verdict reached on this question is given in the pronouncement that the incidence of vibrios inagglutinable with O group I serum in cases of clinical cholera in Calcutta would appear to be no greater than in the general population of the area. That result very nearly if not wholly indicates that vibrios isolated from true cholera cases but which do not conform to the serological O group I are mere accompaniments of the true cholera vibrio and are intestinal inhabitants as much of the non-cholera as of the cholera population.

In India the El Tor type of vibrio has been regarded as non-existent and the only exception to this statement has been found in certain water vibrios in Bengal. Only slight variation seems to have been adopted in the technique of GREIG for determining haemolytic power with goat erythrocytes. The essential difference between the Greig positive and Greig-negative strains found was that fresh cultures of the former gave rapid lysis under all conditions of test while the latter only gave slow lysis in the presence of adequate oxygen and warmth. [See READ *et al* below]

Much attention has been focussed on the biochemical reactions which form the basis of HEIBERG'S classification of vibrios. The three-sugar differential characterization of O group I vibrios as mannose + arabinose - saccharose + is not really differential although if combined with positive cholera red and negative Voges Proskauer reactions it may justify a presumptive diagnosis of *V. cholerae*.

Attempts at forecasting cholera do not appear to have been very successful while it is of great importance to realize that the carrier such as is known in typhoid fever does not exist for cholera. The position may be summed up as (a) The cholera convalescent and the contact carrier in most cases are free from the vibrio after five days from onset of the attack or contact with a connected case (b) Persistence of *V. cholerae* in water is apparently longer the

maximum found being 16 days. (c) The cholera vibrio has not been isolated except in immediate relationship to the cholera case. Thus the cholera case itself appears to be the major factor in disseminating infection and maintaining endemicity while close contact carriers and water sources infected from the case act only as intermediaries for short periods and at short range.

This review should be read carefully for further details.

IV F Harvey

READ (W. D. B.) PA. DIT (S. R.) & DAS (P. C.) Action of *V. cholerae* and El Tor Type Strains on Goat's Red Corpuscles.—*Indian J. Med Res* 1942 Apr Vol. 30 No. 2 pp. 183-212. [10 refs.]

The test of haemolytic power in vibrios established by GREIG in 1914 [this *Bulletin* 1915 Vol. 6 p. 36] has remained valid and is very largely used for the separation of the true classical cholera vibrio. It depends on the power of plain broth cultures of vibrios to haemolyse goat erythrocytes. The authors have modified the test by substituting tryptic digest broth for plain broth and making it isotonic by using 0.85 per cent instead of 0.9 per cent. salt in its composition. They divide vibrio strains into Greig-positive and Greig-negative according as they haemolyse within 24 hours or not. These groups correspond to early haemolytic and late haemolytic. Haemolysis in the latter group is usually partial and never takes place within 24 hours.

A large number of strains was tested and comprised Indian and Celebes vibrios with a few classical El Tor strains. They were tested under aerobic, partial aerobic and anaerobic conditions at incubation temperatures of 37°C and 12°C with 2.5 per cent. and 0.5 per cent. erythrocyte suspensions with organisms grown for 1 to 15 days, and in other ways. Under all these conditions the Greig test for the haemolytic vibrio was supported. An important difference between the early haemolytic and the late haemolytic groups was that the haemolysin of the former was specifically neutralized by an anti-serum prepared from Greig-positive organisms whereas no similar effect was demonstrated in the late haemolytic group. The early and late haemolysins are very likely identical with the haemolysin and the haemodigestive ferment respectively described by van Loghem in respect of solid blood media. [See this *Bulletin* 1914 Vol. 3 p. 480.]

IV F Harvey

CAMMUTHERS (L. B.) Sulphanilylguanidine in the Treatment of Cholera.—*Trans Roy Soc Trop Med & Hyg* 1942 Aug 31 Vol. 36 No. 2 pp. 89-93

In an epidemic of 138 cases of cholera, 50 patients received sulphanilylguanidine in addition to intravenous hypertonic (twice normal) saline and relatively large amounts of sodium bicarbonate by mouth. The remaining cases provided the controls and in these sulphanilylguanidine was not given. The initial dose of the drug was 0.1 gm. per kgm. of estimated body weight and the maintenance dose 0.05 gm. per kgm. every four hours until the stools became normal. The stools were considered to be normal when they had become faecal in character, semi-solid or solid and were not more than two each 24 hours. No toxic symptoms were seen. It may be

concluded that sulphanilylguanidine has no demonstrated value in the treatment of cholera. There were 7 deaths in the sulphanilylguanidine group (50 cases) and 15 in the control group (88 cases) the difference is not of value
W F Harvey

PANJA (G) MALIK (K S) PAUL (B M) & GHOSH (S K) Treatment of Cholera with Pyrogen-Free Saline.—*Indian Med Gaz* 1942 May Vol 77 No 5 pp 282-283

It had been found that cholera cases treated with hospital hypertonic saline were getting severe rigors and pyrexia. The experiments of the authors were directed to obtaining pyrogen free distilled water with which to make up the hypertonic salt solution. This was obtained by redistilling distilled water in an all-glass still in the presence of a few drops of strong sulphuric acid to make it faintly acid to litmus paper and a few crystals of potassium permanganate to give it a faint pink colour during the whole process of distillation. Out of 30 cholera patients treated with this hypertonic saline three developed rigor only and one both rigor and high temperature as compared with one and three respectively out of 18 treated with freshly distilled water saline and 5 and 12 respectively out of 18 treated with ordinarily prepared hospital saline. Pyrogen-free saline can safely be administered in cases with a high rectal temperature
W F Harvey

AMOEBIASIS

ANDREWS (Justin) The Transmission of *Endameba histolytica* and Amebic Disease.—*Southern Med J* 1942. July Vol 35 No 7 pp 693-699 [66 refs.]

This paper is a review of published work and does not contain any original observations. The knowledge of this matter is meagre and unsatisfactory. Reservoirs of amoebic infection are widely distributed and probably constitute in America 5-10 per cent of the population being most numerous in the south, less so in the north-eastern region.

Transmission occurs most frequently by polluted water by means of insanitary methods of excreta disposal, personal contact with carriers insect transmission and contaminated food. Epidemic transmission may be due to water or to flies.

Factors concerned in production or suppression of symptoms appear to be temperature the strain of *E. histolytica* rapid passage dietary effects and acquired immunity.

[These conclusions are based upon an extensive review of the literature]
P Manson Bahr

SCHULZE (William) & RUFFIN (Julian N) The Clinical Aspects of Amebic Dysentery as seen in North Carolina.—*Southern Med J* 1942. July Vol 35 No 7 pp 699-705

The purpose of this paper is to draw attention to the prevalence of amoebic dysentery in North Carolina the ease with which diagnosis can be made by proctoscopic examination in the majority of cases and the prompt and dramatic response to treatment.

Amoebic dysentery may occur at any age and is more prevalent in males. Symptoms accompanying diarrhoea are usually mild occasionally severe the course is chronic with frequent relapses. Physical examination is of little value in establishing diagnosis. Proctoscopy and stool examination are all-important.

The ulcers seen at proctoscopy are so characteristic as to be diagnostic and almost always mucus removed from the ulcer will reveal the presence of trophozoite forms of *E. histolytica*. Other laboratory investigations appear to be of little value and the blood picture is not characteristic. Radioscopy of the colon though sometimes suggestive is rarely if ever diagnostic. Complication in this series of 95 cases were noted in 13 per cent they were either liver or lung abscesses the latter may develop in the absence of diarrhoea or even of any suggestive intestinal history.

In the experience of the authors carbazonc by the mouth and chinolone (qumonal) by retention enema proved most effective, but relapses were common (36 per cent) regardless of the type of therapy employed. The mortality of the whole series was 7 per cent.

The question of diet as a predisposing factor in amoebiasis is discussed. It is emphasized that only two patients could be found who had been subsisting on a well-balanced diet. The remainder were of the tenant farmer class and were known to have subsisted on a deficient diet.

P. Manson Baker

OCHSNER (Alton) & DEBAKEY (Michael) *Surgical Amoebiasis*. New International Clinics 1942, Vol. 1 (n. 3) pp 68-99 With 6 figs. 125 refs.

The object of this symposium is to draw attention once more to the lesions which *Entamoeba histolytica* may produce—manifestations easily confused with other conditions. The fallacious impression still appears to exist that amoebiasis is principally a tropical or sub-tropical disease whilst the contrary is the case. The incidence of infection in the U.S.A. is well over 11 per cent.

On the basis of CRAIG's estimate between six and twelve million people in U.S.A. are infected with *E. histolytica* whilst the potential number of hepatic complication is approximately between three to six hundred thousand amoebic hepatitis represents only one-half of the surgical complications.

Amoebic lesions of surgical import can be classified as follow —

- I Intestinal lesion
 - (a) Appendicitis
 - (b) Perforation with peritonitis
 - (c) Massive haemorrhage
 - (d) Amoeboma (amoebic granuloma)
 - (e) Cicatricial tenos
 - (f) Pseudopolyps
- II Extra intestinal lesions
 - (a) Hepatic abscess
 - (b) Pleuropulmonary affections
 - (c) Cerebral abscess
 - (d) Cutaneous ulceration and abscess
 - (e) Splenic abscess
 - (f) Genito-urinary affections

As regards appendicitis it is stated that in the Tulane Surgical Service in which stool examinations are performed on every patient with a tentative diagnosis of appendicitis some 10 per cent have amoebiasis and are relieved by anti-amoebic therapy. The clinical manifestations are frequently indistinguishable from other forms of appendicitis. Surgical intervention is not only undesirable but may even be dangerous, because such infection is rarely limited to the appendix but usually also involves the caecum. This was clearly demonstrated by the appallingly high mortality rate of appendicectomy following the Chicago epidemic.

The most serious complication of intestinal amoebiasis is perforation of the bowel. It has been estimated to occur in 1.5 per cent of clinical cases. It is more likely in the severe rapidly progressive and fulminating types of amoebiasis.

In such cases surgical intervention can accomplish little but in localized peritoneal infections with walled-off peritoneal abscesses especially in the vicinity of the caecum and sigmoid, the prognosis is better. An illustrative case is cited where fatal peritonitis supervened after a gynaecological operation for removal of fibroids. Massive haemorrhage occurs rarely most usually associated with the rapidly progressive and fulminating types of infection.

An amoeboma (amoebic granuloma) consists of a firm nodular granulomatous inflammatory mass with multiple small abscesses occurring most frequently in the caecum or in the sigmoid. The clinical significance lies in the fact that it may be easily confused with tuberculous actinomycotic or malignant growths.

The use of amoebicides is important even though surgical intervention may subsequently be necessary. A case is quoted of amoeboma of rectum admitted with tentative diagnosis of carcinoma. Diodoquin was employed as an amoebicide but proved ineffective and the patient subsequently succumbed to intestinal obstruction.

Cicatricial stenosis of the large intestine may occur particularly in patients with recurrent infections over long periods of time resulting in destruction of the bowel wall and consequent fibrosis. Such lesions are commonly limited to the caecum and sigmoid though occasionally they may involve the rectum. An illustrative case is quoted in which a rectal stricture was found 5 cm. above the anus in a woman who had suffered continuously from amoebic dysentery for five years. The obstruction was relieved by injections of emetine hydrochloride.

The survey of extra intestinal lesions is very thorough and especially in the case of hepatic abscess follows the generally accepted lines.

P. Manson Bahr

D. ANTONI (Joseph S.) **Amoebiasis. Recent Concepts of its Prevalence, Symptomatology, Diagnosis and Treatment.**—*New International Clinics* 1942 Vol. 1 (n.s. 5) pp. 100-108 [16 refs.]

This paper contains no original work but summarizes the data upon which the importance of amoebiasis as a disease factor in the United States is based.

From a summary of published series of post mortem reports it is evident that amoebic lesions are predominantly present in the caecum and appendix, rectum and sigmoid.

A logical classification would seem to be —

1. Asymptomatic amoebiasis
2. Symptomatic amoebiasis
 - (a) Asymptomatic (formes frustes) Mild toxæmia and vague gastro-intestinal irritation
 - (b) Syndromic Symptoms simulating chronic appendicitis, peptic ulcer chronic cholecystitis with lesions confined to caecum
 - (c) Dysentery (acute or chronic)
 - (d) Hepatitis and liver abscess.
 - (e) Involvement of other organs

P. Manson-Bahr

BERKMAN (John M.) & MAGATH (Thomas B.) Amoebiasis. Report of an Unusual Case.—*U S Nav Med Bull* 1942 Jan. Vol. 40 No 1 pp. 159-163 With 3 figs (2 on 1 plate)

In this case the patient after a long period of vague ill-health, with pain across the shoulders and loss of weight developed moderate pyrexia with continuous leucocytosis (about 15 000) enlargement of the liver elevation and fixation of the diaphragm and extensive but indeterminate X-ray changes at the bases of both lungs. Exploratory laparotomy was performed and subacute appendicitis, with thickening of the adjacent caecum and mesentery of the appendix was found. On this amoebiasis was suspected and after the operation the patient was treated with emetine the temperature fell rapidly to normal and symptoms cleared relatively quickly. *Entamoeba histolytica* was found in sections from the excised appendix.

It is noted that two stool examinations had previously been negative and that exploration of the liver at operation failed to reveal any sign of abscess. Amoebiasis should be suspected in such cases, and if excised material is examined, a considerable number of sections should be cut since in this case some were negative while others contained abundance of amoebae. If the material is placed in formalin it can be re-fixed in corrosive sublimate with acetic acid and satisfactory staining can be carried out with iron haematoxylin. The pathology of the enlarged liver is not clear but under treatment with emetine and trepanned the enlargement subsided.

It is thought probable that the patient acquired her infection during the Chicago outbreak of 1933 but she had no definite symptoms of amoebic dysentery at the time.

BAUMAN (Louis) An Unusual Case of Amoebic Hepatitis.—*Amer J Med Sci* 1942 July Vol 204 No 1 pp 105-107 With 1 chart

1. Acute abdominal symptoms and signs associated with fever and leucocytosis were erroneously diagnosed as appendicitis.
2. Removal of a normal appendix was followed by jaundice abdominal distention tenderness over the liver and fluid in the right chest. A low serum phosphatase was associated with high serum bilirubin.

3 Amebae were found in the stool

4 Three courses of emetine administration were necessary to effect a cure of the amebic hepatitis

WESTPHAL (Albert) Zur Frage der Mischinfektion von Amöbenruhr und Typhus. [The Question of a Mixed Infection of Amoebic Dysentery and Typhoid].—*Deut-Trop Ztschr* 1942 May 15 Vol 46 No 10 pp 258-264

The author originally contracted *E. histolytica* infection in May 1938 during experimental work on amoebiasis. The original strain was of Brazilian origin from a child who was a symptomless carrier of the organism. One year later (1939) in San Domingo whither he had gone to observe the effects of climatic changes on his parasite he contracted typhoid fever and so was able to make observations in his own person on this double infection. In Westphal amoebiasis declared itself as a symptomless lumen infection with *minuta* forms and cysts and his faeces had served as material for experimental work by B. J. BOE (1939).

Already in 1937 he had been interested in the effects of a superadded bacterial action in provoking amoebic dysentery in the carrier state and during this experiment had succeeded in producing acute enteritis and appearance of amoebic dysentery. Later he undertook with MARSHALL experimental work on cats in the same direction from this it appeared that in these animals the bacterial infection which was in fact a septicaemia facilitated penetration of the bowel wall by the amoebae after an incubation period of twenty three days. It was also possible to contrast his self-inflicted experiment with that of KUNERT (1937) under comparable circumstances but in this latter case typhoid infection caused acute amoebic dysentery with blood and numerous *E. histolytica*.

There is a further interest inasmuch as Westphal was treated during the attack of typhoid with pyramidon but in Kunert the amoebic infection was suppressed with yatren without in any way influencing the fever.

It was fully expected that in a typhoid infection which ran its full course conditions would be produced which would stimulate the *minuta* lumen infection to invade the bowel wall or would, at least render local conditions in the mucosa favourable for their entry. In Kunert's case acute exacerbation of amoebic dysentery was noted one week after the diagnosis of typhoid had been established, though no exact observations were made to find out whether the *minuta* became converted into the tissue-invading forms of *E. histolytica* but in Westphal's case during the whole course of the illness no alteration in numbers or character of *minuta* amoebae or cysts was observed nor did the stools ever contain blood or mucus.

From the therapeutic aspect, therefore the typhoid exerted no influence upon the amoebic infection, nor did the amoebiasis influence the typhoid so that the end of the illness found him in the same state as before with a lumen infection with *minuta* forms and cysts. In Kunert's case apparent cure of amoebiasis with yatren did not influence the course of the typhoid. An explanation of this anomaly can be made on the assumption of varying virulence in different strains of *E. histolytica*. In the parallel studies in cats it was found that the banishing of the typhoid like bacterial lesions in the bowel was followed by simultaneous healing of the amoebic ulcers. The author believes the

A logical classification would seem to be —

- 1 *Asymptomatic amoebiasis*
- 2 *Symptomatic amoebiasis*
 - (a) *Asyndromic* (formes frustes) Mild toxaemia and vague gastro-intestinal irritation
 - (b) *Syndromic* Symptoms simulating chronic appendicitis, peptic ulcer, chronic cholecystitis with lesions confined to caecum.
 - (c) *Dysentery* (acute or chronic)
 - (d) *Hepatitis and liver abscess*
 - (e) *Involvement of other organs*

P Manson Bahr

BERMAN (John M.) & MAGATH (Thomas B.) *Amoebiasis. Report of an Unusual Case.*—*L S Med Bull* 1942, Jan. Vol 40 No 1 pp 159-163 With 3 figs (2 on 1 plate)

In this case the patient after a long period of vague ill-health, with pain across the shoulders and loss of weight developed moderate pyrexia with continuous leucocytosis (about 15 000) enlargement of the liver, elevation and fixation of the diaphragm and extensive but indeterminate X-ray changes at the bases of both lungs. Exploratory laparotomy was performed and subacute appendicitis, with thickening of the adjacent caecum and mesentery of the appendix, was found. On this amoebiasis was suspected and after the operation the patient was treated with emetine the temperature fell rapidly to normal and symptoms cleared relatively quickly. *Entamoeba histolytica* was found in sections from the excised appendix.

It is noted that two stool examinations had previously been negative and that exploration of the liver at operation failed to reveal any sign of abscess. Amoebiasis should be suspected in such cases, and if excised material is examined, a considerable number of sections should be cut, since in this case some were negative while others contained abundance of amoebae. If the material is placed in formalin it can be re-fixed in corrosive sublimate with acetic acid and satisfactory staining can be carried out with iron haematoxylin. The pathology of the enlarged liver is not clear but under treatment with emetine and trepanol the enlargement subsided.

It is thought probable that the patient acquired her infection during the Chicago outbreak of 1933 but she had no definite symptoms of amoebic dysentery at the time.

C II

BATMAN (Lynn) *An Unusual Case of Amoebic Hepatitis.*—*Amer J Med Sci* 1942, July, Vol 204 No 1 pp. 105-107 With 1 chart

- "1 Acute abdominal symptoms and signs associated with fever and leucocytosis were erroneously diagnosed as appendicitis.
- "2 Removal of a normal appendix was followed by jaundice, abdominal distention, tenderness over the liver and fluid in the right chest. A low serum phosphatase was associated with high serum bilirubin.

abscess the size of the liver shadow is an indication of the does not serve to localize it exactly

ization of cancerous metastases in the liver has been possible with Jodsol. The second attempt at outlining liver with this substance was successful. An air vesicle was apparent in this substance which subsequently was shown to be a portion of intrahepatic abscess

Technique of Jodsol administration consists of preliminary iodine toleration by means of 0.5 gm. potassium iodide a plain X-ray of the abdominal cavity is taken and injected intravenously in doses of 250-300 mgm. of iodine in 20 per cent solution. The injection must be made slowly minute. After an interval of one hour the liver radiographs

Excellent radiosopic pictures which illustrate this paper are criticism but this must be directed towards their interpretation. To the viewer it would appear that none of the intestinal appearances are peculiar to intestinal amoebiasis—rather he would suggest whether the primary microscopic diagnosis was at fault or that there is a superadded complication, in some cases such as polyposis (figs. 3 and 8) or diverticulosis (figs. 3 and 4) whilst two (figs. 5 and 6) suggestive of a chronic inflammatory colitis such as ulcerative or chronic bacillary dysentery.]

P Manson-Bahr

LA SERRA (Juan) Contribución al estudio de las reacciones anéas en la amebiasis intestinal crónica. [Cutaneous Reactions Chronic Intestinal Amoebiasis].—*Rev. Argentina de Dermatología* 1942 Vol 26 Pt 2 pp 327-333

Conditions referred to here are of an allergic nature and are to be distinguished entirely from amoebic lesions of the skin—cutaneous amoebiasis—such as may be found for example in the area surrounding an amoebic abscess. The former to which the term *amoebides* is given are characterized by their being as stated above a manifestation of allergy by absence of the amoeba from the skin by its presence in the faeces and by their curability with anti-allergic treatment. Associated symptoms are local pruritus, obstinate itching, perhaps with recurrence of dysentery. Brief notes are given on such cases in which the patients would suffer from headache, disturbed sleep, nightmares etc. together with some other manifestation such as a local pruritus, urticaria, eczema or dermatitis, which resisted all the usual forms of treatment but cleared up on the discovery of *E. histolytica* was made (or other *Entamoeba* species [? *Endolimax*] *nana* in two cases) and the appropriate treatment adopted. [WELBY (Protozoology, 1926 p. 240) states there is no evidence that *Endolimax nana* is in any way pathogenic, owing so it is difficult to see how it can be responsible for allergic reactions.]

A very instructive example is that of a man employed in a cigar factory who had lesions of both hands and arms ascribed to his occupation, treated ineffectually for some months till it was found that the lesions contained *E. histolytica*. A course of emetine followed by rest and enterovioform wrought complete cure.

H. Harold Scott

incubation period to be important in so far as it depends upon local necrotic damage to the mucosa by subacute bacterial infection, which forms a *locus* for the penetration of the amoebae into the bowel wall but possibly in acute infections such as typhoid other influences are brought to bear which counteract this.

P Manson-Bahr

Mohr (Werner) Bedeutung und Möglichkeiten der Röntgenuntersuchung bei Amöbenruhr und ihren Folgezuständen [Radiological Investigation of Amoebic Dysentery and its Sequelae].—*Deut Trop Ztschr* 1941 Juli 15 Vol 45 No 14 pp 417-427 With 12 figs.

Introduction of the mucosal relief technique in radiology has opened up new possibilities in diagnosis of intestinal amoebiasis. As a basis of his studies Mohr subscribes to the thesis of WESTPHAL that bacterial symbiosis is necessary for the production of necrotic foci in the mucosa so as to enable entamoebae from the lumen to penetrate the muscularis mucosae.

Preparation of the patient is important. A cleansing enema is given 2-3 hours before and the barium enema is preceded by proctoscopy which not only prevents a picture of the nature and extent of the ulceration but also ensures that faecal evacuation has been completed (care must be exercised against over inflation of the bowel which may spoil contrast relief). In the early phases of amoebic dysentery changes in this mucosal pattern are slight and consist of flattening of the mucosal folds and a blurring of the outline but with more extensive lesions a cushion shaped filling defects become visible with irregularities in the pattern of the transverse folds but there is really nothing in the representation of the button hole ulcers to differentiate this from other forms of colitis.

Double contouring of the evacuation picture which is evoked by production of mucus as well as by ulceration, is sometimes also observed in the descending colon. In the most advanced stage the filling picture shows absence of haustration and saw-edge indentations (as in diverticulosis). Then the mucosal relief pattern is no longer recognizable. Sometimes a finely granular pattern may be recognized which signifies pseudopolypoid formation. The sudden change from the abnormal to the normal relief picture in sharply defined sections of the large intestine is held to be characteristic of intestinal amoebiasis. Any definite ruling regarding the exact localization of the process is difficult to formulate but in the great majority of cases it is localized in the descending and sigmoid colons and not infrequently in the caecum and ascending colons. seldom in the transverse.

It is emphasized that radioscopy alone cannot be considered as of prime diagnostic importance but as an accessory to faecal examination. It constitutes however a very definite indication for treatment. Then lesions of the caecum and ascending colon are present the administration of oral yatrien is indicated. The appendix may be involved and this has a definite bearing upon possible operation. One patient is cited with tenderness in the right iliac fossa. Definite lesions in the appendix were localized by radioscopy and the condition yielded altogether to energetic amoebic treatment. Radioscopy may also in case of necessity be as an indication when operation should be performed.

In liver abscess the size of the liver shadow is an indication of the abscess but does not serve to localize it exactly.

The localization of cancerous metastases in the liver has been rendered possible with Jodsol. The second attempt at outlining liver abscess with this substance was successful. An air vesicle was apparent in the liver substance which subsequently was shown to be a portion of a loculated intrahepatic abscess.

The technique of Jodsol administration consists of preliminary testing of iodine toleration by means of 0.5 gm. potassium iodide. If negative a plain X ray of the abdominal cavity is taken and Jodsol is injected intravenously in doses of 250-300 mgm of iodine per kilo in 20 per cent. solution. The injection must be made slowly 3 cc. per minute. After an interval of one hour the liver radiographs are taken.

[The excellent radiosopic pictures which illustrate this paper are beyond criticism, but this must be directed towards their interpretation. To the reviewer it would appear that none of the intestinal appearances shown are peculiar to intestinal amoebiasis—rather he would suggest that either the primary microscopic diagnosis was at fault or that there were superadded complications in some cases such as polyposis (figs 7 and 8) or diverticulosis (figs 3 and 4) whilst two (figs 5 and 6) are suggestive of a chronic inflammatory colitis such as ulcerative colitis or chronic bacillary dysentery.]

P Manson Bahr

BAUTISTA SERRA (Juan) Contribución al estudio de las reacciones cutaneas en la amebiasis intestinal crónica [Cutaneous Reactions in Chronic Intestinal Amoebiasis]—Rev Argentina de Dermatología 1942 Vol 26 Pt. 2 pp 327-333

The conditions referred to here are of an allergic nature and are to be distinguished entirely from amoebic lesions of the skin—cutaneous amoebiasis—such as may be found for example in the area surrounding a draining amoebic abscess. The former to which the term *amoebides* has been given are characterized by their being as stated above a manifestation of allergy by absence of the amoeba from the skin lesion by its presence in the faeces and by their curability with anti amoebic treatment. Associated symptoms are local pruritus, obstinate urticaria perhaps with recurrence of dysentery. Brief notes are given of fifteen such cases in which the patients would suffer from headache, constipation, disturbed sleep, nightmares etc together with some cutaneous manifestation such as a local pruritus, urticaria, eczema or pityriasis, which resisted all the usual forms of treatment but cleared up when the discovery of *E. histolytica* was made (or other *Entamoeba*, *Entamoeba* [?] *Endolimax*] *nana* in two cases) and the appropriate treatment adopted. WENYON (Protozoology 1926 p 240) states that there is no evidence that *Endolimax nana* is in any way pathogenic. This being so it is difficult to see how it can be responsible for cutaneous reactions.]

One very instructive example is that of a man employed in a cigar factory he had lesions of both hands and arms ascribed to his occupation and was treated ineffectually for some months till it was found that the stools contained *E. histolytica*. A course of emetine followed by amoebarson and enterovioform wrought complete cure.

H Harold Scott

RELAPSING FEVER.

COOPER (Eric L.) Relapsing Fever in Tobruk.—*Med Jl Australia*
1942 June 6 29th Year Vol. 1 No. 23 pp 635-637

A description of 68 cases of relapsing fever which passed through an Australian General Hospital in Tobruk during May to August 1941.

Thirty-nine of the soldiers affected had been living in caves or in old dugouts constructed by the Italians, but these had not been occupied by either Italians or Libyans for the three months before the first appearance of the disease. Caves, dugouts, tank traps and trenches were infested with rodents. Ticks were found in all trenches and a hospital orderly who had lived in a new trench developed relapsing fever. The disease also occurred in men from units living in various quarters scattered through the fortress area.

Nineteen men gave definite histories of tick bite. It is also stated that in a few cases the first pyrexial attack occurred 8 days after ticks had been removed from the skin. The number of attacks varied from 1 to 10, the mean being four. The total duration of illness before returning to duty varied from 3 to 26 weeks, the mean being 12 weeks.

The clinical aspects of the disease are reviewed. Fever associated with the presence of spirochaetes in the blood was the only feature common to all these cases. Some patients had symptoms and signs suggesting involvement of the central nervous system, the reticulo-endothelial tissues, the renal tract or the lungs. Late involvement of the central nervous system with facial paralysis was relatively common. It is emphasized that the blood must be examined repeatedly, in thick films, in order to be sure of diagnosis and that spirochaetes are most likely to be found at the beginning of a febrile attack.

The disease did not respond to arsenic given intravenously in the doses generally used for the treatment of louse-borne relapsing fever. Relapses occurred after arsenic treatment in 41 out of 57 patients, but the quantities of arsenic used in these patients were much less than those used in syphilis, so that a full opinion as to its efficacy cannot be given. [The species of tick is not stated and although the disease is presumably one of the North African rodent strains transmitted by various species of *Ornithodoros*, the statement that in many cases ticks were removed from the skin suggests that other genera may have been involved.]

E. Hindle

ROBINSON (P.) Relapsing Fever in Addis Ababa.—*Brit Med Jl*
1942 Aug 22 pp 216-217

A report based on 340 cases of relapsing fever [*S. recurrentis*] in Addis Ababa observed during the second half of 1941.

The infection is assumed to be transmitted by the body louse since mixed infections of relapsing fever and louse-borne typhus were common. Spirochaetes were often found in crushed lice collected from relapsing fever patients and ticks were not found nor any evidence of tick bites.

The routine method of diagnosis was the examination of thick blood films which revealed spirochaetes in most cases even in the afebrile stage. Jaundice was frequent. A rash with a typical violet shade usually developed on the shoulders. Tongue pain, atrophy and

ulcerations were also typical. Systolic and diastolic murmurs were frequent and also additional evidence suggests that the disease causes cardiac lesions.

The author found that the serum of these patients agglutinated the Kingsbury strain of *Proteus* in a high titre sometimes up to 1:3,200. This A.A. agglutination was found in 98 per cent of the 168 cases examined and is considered to be the result of the relapsing fever infection.

The cases were treated by one, two or three injections of N.A.B. but relapses occurred. The haemorrhages caused by prothrombin deficiency were successfully treated with vitamin K which is recommended for all relapsing fever cases.

The mortality rate was 3.5 per cent. Perisplenitis, spleen infarcts and endocarditis were observed at necropsy.

E Hindle

ROBINSON (G. G.) The Quantitative Interaction of Spray Fluid and Active Principle in Determining the Toxicity of a Pyrethrum Preparation to the Argasid Tick, *Ornithodoros moubata* Murray.—*Ann Applied Biol* 1942 Aug Vol. 29 No 3 pp 290-300. With 3 figs. [14 refs.]

This paper forms part of a study aiming at the discovery of a contact insecticide suitable for use against *Ornithodoros moubata*. The author deals here chiefly with the results of applying an extract of Pyrethrum in white oil (initial B.P. 325°C viscosity Redwood I at 20°C 141 secs) either directly to the tick or as a film on a surface over which the tick subsequently crawls. He shows that by either method, if the same total weight of pyrethrins is applied over a given area, these are more lethal in dilute solution (e.g. 0.13 per cent) when the total weight of the pyrethrins is small, they are more lethal in concentrated solution (e.g. 1.3 per cent) if the total weight of pyrethrins is large. These results are explained by the extent to which the permeable areas of the cuticle are covered by insecticide in the two cases, that is, on a balance between the inherent toxicity of the active principle and the bulk or availability of the dose.

V. B. Wigglesworth

LEPTOSPIROSIS

SCHÜFFNER (W.) Die Bedeutung der Weilschen Krankheit bzw. der Leptospireninfektionen für Afrika. [The Importance of Weil's Disease and other Leptospiral Infections in Africa.]—*Deut Trop Ztschr* 1941 May 1 Vol. 45 No 9 pp 257-272. With 19 figs.

A general account of the subject containing nothing original. [The main interest of this and other articles in this journal lies in their political implications as they are concerned with diseases in Africa. In the discussion following Schüffner's address presumably given early in 1941 Uhlenhuth recommended the immediate organization of an Expedition to inspect their future place of work ('zukünftiges Arbeitsgebiet').]

E Hindle

STARBUCK (Elizabeth B.) & WARD (Thomas G.) Comparison of a Recently Developed Macroscopic Agglutination Test for the Diagnosis of Leptospirosis with the Standard Microscopic Test.—*Jl Infect. Dis.* 1942 Jan.-Feb. Vol 70 No 1 pp 88-91 [Summary appears also in *Bulletin of Hygiene*]

It will be readily acknowledged that a macroscopic test in which preserved leptospira culture could be used would be of the greatest value in diagnosis of leptospirosis. For the *microscopic* test the authors use cultures obtained on a modified Noguchi semi-solid medium, by incubating at 32°C. for 5-7 days. 0.2 cc. of such a culture of actively motile leptospira is mixed with an equal quantity of serum (diluted) and examined by dark-ground illumination for agglutination after being kept in a water-bath for 1½ hours at 37°C. The highest dilution causing agglutination gives the titre of the serum.

For the *macroscopic* test a formalized culture is used, a small amount of gentian violet being added to facilitate reading of results. One drop of the antigen and one of the various dilutions of serum are mixed in squares ruled on a slide, rocked for 10 minutes and then examined over a white background by diffuse transmitted light. If the result is positive light blue aggregates are seen.

Three hundred and fifty-six sera were tested and the results are presented in the following table—

Comparison of Results obtained by testing Sera for Agglutinins against L. icterohaemorrhagiae by the Standard Microscopic and by the Macroscopic Test

Groups Tested	Number Tested	Microscopic Test		Macroscopic Test	
		Number Positive	Number Negative	Number Positive	Number Negative
University students	50	0	50	0	50
Specimens from Wassermann laboratory	294	9	285	2	292
Eagle test negative	259	9	244	2	251
Eagle test positive	41	0	41	0	41
Suspected cases of Weil's disease	7	3	4	3	4
Known positive sera	6	5	0	4	1
Total	356	17	339	9	347

Important points are that of 7 suspected cases of Weil's disease 3 were positive to both tests, microscopic and macroscopic. Of 8 positive to the former 4 were positive to the latter, the fifth being positive microscopically in low dilution only. The macroscopic test proved to be highly specific and no false positives were given by it, judging by the standard microscopic method.

Tests to compare the relative sensitivity of the two methods showed that the macroscopic was less sensitive than the microscopic. Of 24 human sera tested by the authors by both methods, 15 with a titre of above 1:200 by the microscopic were also positive by the macroscopic test, of 9 with titres of 1:100 or less by the former 8 were negative by the latter. The titre by the latter (macroscopic)

method was always much lower than that by the former (microscopic) but since patients with leptospiral jaundice usually gave agglutination with their sera in very high dilution this lower degree of sensitivity is sufficient for diagnosis. Also it is more easily carried out and takes much less time than the microscopic test

H Harold Scott

YAWS

DUPONT (Adolphe) & DUBOIS (A) Contribution à l'histopathologie du pian [The Histopathology of Yaws.]—*Ann Soc Belge de Méd Trop* 1940 Dec 31 Vol. 20 No 4 pp 461-477 With 8 figs. & 2 photos on 5 plates

This article is difficult to abstract satisfactorily, for it describes minutely the histological changes observable in the cutaneous lesions of the different stages of yaws and compares them with those of syphilis and of leprosy. The chief of these differences will be referred to here; those wishing for more detailed information should consult the original where the lesions are well shown by a series of photomicrographs. The descriptions are based on biopsies from one patient with a primary yaw four in the secondary and twenty in the later stages of the disease. Search for the spirochaete has not been attempted for the portions of tissue excised were fixed in Bouin's fluid which cannot be followed by silver staining. The Congolese distinguish with confidence yaws from syphilis. Moreover syphilis provokes repeated abortion and affects infants born alive whereas yaws has no effect on pregnancy and does not harm the foetus.

The primary lesion is a papule involving the epidermis and dermis, its centre undergoing necrosis leading to the production of an ulcer. Cellular infiltration is limited even when the involvement of the epidermis is considerable. The papillae are very congested, the vessels dilated and there is marked local oedema, the fluid containing polymorphonuclears, lymphocytes and histiocytes. The epidermal ridges are thickened, less at the periphery more towards the centre. The polymorphonuclear cells penetrate the mucous bodies of the dermal papillae [these are not further defined] and the canals formed are invaded by the oedema. The noteworthy point is that the ulceration attacks only those parts of the epithelium which cover the dermal papillae. In contradistinction to this the syphilitic chancre erodes the epidermis setting up practically no reaction; it also extends more deeply.

In the second stage—the classic frambœsia—the above changes are much more in evidence. There are large papules formed by inflammatory infiltration, always superficial and very compact with marked hypertrophy of the epidermal ridges which are almost of a vegetating character. As the cellular infiltration increases imbibition of oedema fluid by the connective tissue diminishes and the vascular congestion is less.

The dermal lesions of secondary syphilis often bear a close resemblance to those of yaws. In both there are exuberant proliferation of the epithelium, dense infiltration with the plasmocyte as the predominant cell and invasion of the surface layers by polymorphonuclears with formation of a crust. In yaws however the inflammatory infiltration

is as it were condensed—it barely extends beyond the limits of the dermal papilla and appears as an almost horizontal layer sending out thin extensions into the corium. In a syphilitic condyloma the infiltration is more extensive and usually prolonged into the corium ensheathing its blood-vessels.

In the third or gummatous stage the appearance is that of a large tuberculous follicle. The central part which makes up nine-tenths of the mass, is formed of a dense homogeneous aggregation of epithelioid cells with giant cells of the Langhans type isolated or grouped here and there these cells undergo more or less complete caseation. In the midst of the mass one may see a number of quite healthy capillaries. Lymphocytes and plasmocytes encircle the central epithelioid mass. The most striking feature of the *yaws* gumma is the predominance almost the exclusiveness of the epithelioid element in the infiltration the common inflammation cells—lymphocytes and plasmocytes—play but a minor rôle. This is in marked distinction from the syphilitic gumma in which at the onset the plasmocyte in later stages the lymphocyte dominates the picture. In the latter also vascular lesions are important the vessel wall are destroyed till there remains merely the elastic skeleton and a sclerosed mass, whereas in the former the epithelioid cell agglomerate and infiltrate between the structures of the vessel wall without destroying it and little by little block the lumen.

Confusion with leprosy arises from similarity of the nodular infiltrations. Both show masses of epithelioid cells with scattered giant cells in greater or less abundance. In leprosy however the trails of inflammatory cells surround the branches of the cutaneous vessels and nerves from the papillae to the subdermal *stratum retiforme* the epithelium itself largely escapes attack and infiltration in the nerve filaments is characteristic. The infiltration involves both deep and superficial layers.

In *yaws* on the contrary the lesions are agglomerated. The superficial papules of the skin show an infiltration in the dermal papillae and the upper part of the corium in immediate contact with the epidermis, and form a large nodule with a halo of aggregated inflammatory cells more and more discrete and wider apart as the distance increases from the centre of the lesion. The inflammatory cells encroach on the epithelial layers which they separate by penetration. In short in both the infiltration is frankly tuberculous in leprosy it has a tendency to spread in depth as well as superficially whereas in *yaws* it remains superficial with a tendency to compact nodule formation. [See also this Bulletin 1939 Vol 36 p 45]

H Harold Scott

LEPROSY

DAVIS (T F) Leprosy Control in the Owerri Province, Southern Nigeria.—*Leprosy Review* 1942 Apr-July Vol 13 No 2. pp 31-48 With 2 maps

This report records remarkable progress in the control of leprosy in a badly infected portion of Southern Nigeria. At the end of 1941 1 072 cases many requiring hospital treatment were isolated in the central Umuahia settlement 2 000 more infective cases are voluntarily

isolated in model leper villages constructed on sanitary lines by the patients under the instruction of the staff of the settlement on sites provided free by the local Chiefs with land to cultivate for their own maintenance. These and the other cases of leprosy in the surrounding villages were being treated at 29 clinics (with four more about to be provided) in which 7 183 cases are cared for mostly early amenable ones which are six to ten times as numerous as the advanced all of whom live within five miles of the clinic they attend. In considerable areas complete control of all the leprosy cases has been attained, first by starting a clinic for treatment and then after the confidence of the villagers has been obtained conducting a house-to-house survey which leads to about three times as many cases being found and treated. Over 70 male nurses have been trained in the settlement by nursing sisters together with a few Toc H workers and a number of educated native leprosy inspectors who carry out the surveys and superintend the construction of the model leper villages in which none but lepers are allowed to reside. Recorded infection rates vary in different villages from 1.3 to 15.2 per cent. By these very economical measures the only limit to the extension of the work is the provision of more workers and moderate funds for at present only two medical men superintend the whole of the work in caring for some 10 000 leprosy cases on the books.

L. Rogers

BLOSS (J. F. E.) Li Rangu Leper Settlement.—Report of Sudan Med Service for Year 1940 pp 16-21

The estimated number of leprosy cases in the Sudan is about 8 000 the known cases number 5,888. Of the latter 3 637 are in the humid southern Equatoria province and 1 992 more are in the Central Kordofan area leaving only 259 in the dry northern area. The largest number are in the Li Rangu district where 956 remain in the settlement and 1 458 are out patients in the Yambio sub-district the latter obtain treatment at dispensaries. The leprosy incidence here is at the high rate of 4 per cent. From Li Rangu 299 patients were discharged in 1940 and a further 120 were to be set free in the next year. Most of the remaining cases will be those which are bacterially positive. Pure *Hydnocarpus wightiana* oil is used for injection treatment. Complications due to bilharzia and ankylostomiasis have been greatly reduced by treatment.

L. Rogers

LEPROSY IN INDIA. 1942. Apr. Vol. 14 No. 2. pp 41-72.—Report of the Leprosy Survey Sub-Committee of the Indian Research Fund Association, September, 1941

Under the chairmanship of Dr J. Lowe this committee dealt with both the principles and practical details of leprosy surveys of three types in India. (1) Surveys of large areas to ascertain the approximate incidence distribution and epidemiological features where little is known about the disease. Selected portions of the district or province are carefully studied as samples of the whole including parts believed to have high and low incidence. The examination of contacts of known cases and of all village children reveals unreported cases. Schedules are given for entry of the results obtained on uniform lines. (2) Surveys of smaller areas with a view to the detection and recording of as many

(December 1942)

as possible of the cases where the disease is already known to be prevalent with full examination of the population of a union or group of villages for five miles around an anti-leprosy centre (3) Specially detailed studies of the epidemiology of leprosy with examination of every individual village by village of small populations of three to ten thousand people carried out by experienced workers. Detailed records with all the cases marked on village maps are prepared to allow of re-surveys to ascertain the changes taking place within a given time. The types, age incidence type distribution in relation to age evidence of increase or decrease are all noted to allow of the relative importance of leprosy as a serious public health problem to be ascertained. Where the disease is prevalent anti-leprosy work includes the provision for isolation of infective cases in homes villages colonies or institutions, and provision for diagnosis and treatment at existing hospitals dispensaries and in special leprosy clinics. Propaganda is essential to create in the villages, public opinion that will insist on isolation of the infective cases to be established and maintained. Re-surveys are of great value in estimating the progress being made in any area.

L. Rogers

Muir (E) Report of Leprosy in British Guiana.—*Leprosy Review* 1942 Apr-July Vol 13 No 2 pp 22-31

This report brings out well the success of the 15 years devoted work of Dr F G ROSE. British Guiana was the first of our colonies to modify at the suggestion of B E I R A their compulsory segregation laws relating to all types and forms of leprosy so as to permit early and uninfected cases to be treated at out patient leprosy clinics. There are now nine clinics treating 500 cases out of a total of 1,000. The 500 more advanced and infective patients are cared for in the up-to-date leprosy colony at Mahanica most of the inmates of which are now voluntary admissions for the sake of treatment. Yet in 1923 before the law was relaxed, only 287 cases were segregated at Mahanica, but by 1932 747 lepers were in residence there. The value of regular and persistent treatment is shown by the fact that among the patients who received 61 to 100 per cent of the prescribed course 71.4 per cent became arrested cases against only 16.7 per cent. of those who received 60 per cent or less of the course. Child cases are accommodated in a separate building and healthy children of leprosy patients in the Lady Denham Home. During his 1941 visit Muir records that he saw many formerly advanced lepromatous patients who had been free from infection and active symptoms for years. He concluded that there is good reason to believe that this decline in notifications [namely of the year admissions from 40-100 to only 30] is the result of actual decrease of leprosy in the colony.

L. Rogers

Sager (G H) The Story of the National Leprosarium (U.S. Marine Hospital), Carroll, Louisiana.—*Public Health Rep* 1942 May 1 Vol 57 No 18 pp 641-652 With 4 figs on 2 plates

This is an interesting account of the best equipped leprosarium in the world. The author first refers to the unjustified fear of leprosy among the general public. The origin and spread of leprosy in the United States is attributed to its introduction into Louisiana by the Indians from Canada, by Scandinavians into Minnesota, and by negro

slaves and Chinese and other immigrants. The establishment of the Louisiana leper settlement and its conversion into the present federal settlement at Carville in 1921 is described. Extensions at a cost of \$645 000 enlarged the accommodation from 90 to 425 by 1923 and in 1940 the wooden buildings were replaced by permanent structures at a cost of approximately \$2,500 000. Many further expensive additions include electricity and water supplies, laundries, departments for radiology, dentistry, bacteriology, physiotherapy, etc., and a recreation building costing \$140 000. The medical staff includes five doctors, one dentist and three consultants and a full time bacteriologist. Post-graduate teaching is carried out.

During the earlier period of State control 333 patients were admitted, all but 16 from Louisiana State. Between 1921 and 1942, 1 034 were admitted, 593 died, 53 left for foreign countries and 309 have been discharged as no longer a menace to public health. 58 of these have returned with relapses. Of the total patients admitted 404 were foreign born. Louisiana furnished 576, California 194, Texas 192, New York 118 and Florida 76, leaving only 215 from all the other States. In treatment vitamins were used as tonics, but vitamin A in the form of alfalfa did not seem to be as effective as had been hoped. Vitamin B₁ was of value in relieving painful leprosy neuritis, but diphtheria toxoid in a carefully controlled trial was as disappointing as elsewhere.

L. Rogers

DE SOUZA ARAUJO (H. C.) Infecção de ratos brancos com suco glandular de leproso seguida do isolamento dum bacilo ácido-alcool resistente de órgãos do murideo em meio de Loewenstein. Nota prévia. [Infection of White Rats with Gland-Juice from a Leper, Isolation and Growth of an Acid-fast Organism.]—*Mém. Inst. Oswaldo Cruz* 1941 Nov. Vol. 36 No. 3 pp. 379-385. With 15 figs. on 4 plates.

Though this is a short paper, in fact a preliminary note, its importance calls for a full account. In view of repeated fruitless attempts to cultivate Hansen's bacillus from emulsions of lepromata, skin lesions, nasal mucus and blood, the author started a series of investigations on the sputum and gland juice of lepers. From 42 samples of sputum he obtained 11 cultures of *Mycobacteria*, 10 of which had all the characteristics of the human eugonic type of *M. tuberculosis*. Of 15 samples of gland juice seeded on media appropriate for growing acid fast bacilli, one gave a pure culture which also had the characteristics of *M. tuberculosis*. He then proceeded on the following lines suggested by the work of MARCHOUX.

A man of 26 years, showing typical symptoms of leprosy—thickening of the ears, enlargement of the cervical and inguinal glands, swollen nose, macules on the forehead, cheeks, chest and abdomen, lepromata on buttocks, thigh and elsewhere—came under the author's observation in August 1938. The nasal mucus, fluid from skin puncture, juice from a cervical gland, all showed Hansen's organism. The Witebsky reaction was 6 plus, the Wassermann reaction negative. During 1939 the patient suffered from repeated leprotic reactions with exacerbation of the cutaneous lesions and suppuration of the groin glands, the pus containing abundant bacilli. In June 1939 some gland juice rich in bacilli was emulsified in saline and injected (as suggested by Marchoux for Stéfansky's organism) subcutaneously in the axilla of a white rat.

Five months later the animal was killed. The axillary and inguinal glands were much enlarged and contained many bacilli like those of Hansen. Smears of the viscera did not show them, probably it was too early for visceral involvement. In January 1940 pus from the patient's groin gland was inoculated into three white rats subcutaneously in the axilla and the following month gland-juice into a fourth rat. (Frei's reaction was tried because of the inguinal adenitis but proved negative, thus ruling out lymphogranuloma inguinale). The sputum contained no tubercle bacilli and guinea-pig inoculation was also negative.

Fifteen months later one of the inoculated rats died, showing areas of alopecia on the back and lesions, containing bacilli in the spleen. Two months later another died and autopsy revealed glands and viscera rich in acid-fast bacilli. These organs were sent to Dr. Margat Torres together with a portion of the liver on ice for seeding. This was triturated and sown on Löwenstein's medium. Dr. Torres reported that the tissues showed generalized infection with lepromatous lesions. A detailed description is given and illustrated by photomicrograph. A fortnight after the sowing the medium showed growth of acid-fast organisms in bundles and clumps. Four rats and a monkey were inoculated with the culture on the 2nd and 11th August 1941 respectively. The result of these will doubtless be reported in due course.

Eighteen months after being inoculated the third rat was killed. It showed alopecia on the back, the root of the tail and the right hip. The glands were enlarged and contained what seemed to be purely Hansen's bacilli but smear of the viscera did not show any.

The author concludes —

- 1 The gland juice of a leper is infective for white rats.
- 2 After an incubation period of 15-18 months, rats inoculated with this gland juice show typical signs of leprosy in their glands and viscera.
- 3 Seeding on Löwenstein's medium, of emulsions of the organs of infected rat gives rise to the growth of a pure culture of an acid-fast bacillus which is not *M. tuberculosis*.
- 4 This work ought to be repeated on a larger scale as it points out a way of clearing up obscurities in the aetiology of human leprosy.

H. Harold Scott

MARCHELLE (E.) (BORNE (V.) CHABAUD (A.) & TISSEUIL (J.) Essais négatifs de la transmission de la lèpre humaine au hamster de Syrie *Cricetus auratus*. Negative Leprosy Transmission Trials on Hamsters. — Ann Inst Pasteur 1942 Feb Vol 68 No 2 pp 99-103

This paper records the negative result of attempts by different methods of inoculation to infect hamsters with human leprosy material. The experiments were carried out with 40 animals who had had their spleens removed. These with 25 in which the spleens were intact were inoculated subcutaneously with emulsions or small fragments of lepromatous spleen with intact spleen were inoculated intraperitoneally. The authors point out that the long survival of leprosy bacilli in large numbers at the site of injection, or in the internal organs in small numbers, furnishes no proof of infection because ARAUJO in Brazil showed that this may occur after inoculation of killed leprosy bacilli. They obtained no evidence of multiplication of the bacilli.

in any of the inoculated animals. The hope that infected hamsters might be used for chemotherapeutic tests must therefore be abandoned
L Rogers

DE SOUZA ARAUJO (H. C.) Poderá o carrapato transmitir a lepra?
[Can Leprosy be transmitted by Ticks?]-*Mem Inst Oswaldo Cruz* 1941 Dec. Vol 36 No 4 pp 577-585 With 2 plates
(1 coloured) [10 refs.] English summary

1 RUDOLPH (1918) stated that until 13 days after the last feeding on lepers nymphs of *Amblyomma cajennense* had in their intestines leprosy bacilli which he considered as alive. The author of the present paper found that such bacilli are in degeneration after a week of the sucking perhaps because they are being digested.

2 The examined nymphs within the first 48 hours after sucking on active lepers showed in smears of their sediment in more than 60 per cent of them, homogeneous bacilli well stained by Ziehl Neelsen method in small bundles or in small spheric or ovoid globules with the characteristics of Hansen's bacillus. By culture in Loewenstein medium of such material and by inoculation of it in white rats the author supposes that it is possible to prove the vitality and virulence of the organisms.

3 If the *Amblyomma* ticks change their hosts during their three suckings of blood necessary to their life cycle such ticks may be occasional carriers of leprosy bacilli.

4 Considering that ticks are widespread in the States of Brazil and that leprosy is an endemo-epidemic scourge in rural zones of many States it is urgent to determine the real rôle of such parasites in the transmission of human leprosy.

Addendum: After 62 days' incubation at 37°C the author obtained a pure culture of an acid fast bacillus from sediment of ticks captured on lepers.

The medium used was that of Loewenstein

CHABAUD (A.) Altération du bacille de Hansen par les fixateurs. Rôle protecteur de l'acide phénique [Alteration of Hansen's Bacillus by Fixation Agents.]-*Ann Inst Pasteur* 1942 Feb Vol 68 No 2 pp 106-113

The author in this note points out that long fixation of human leprosy material in Bouin alcohol alters the bacilli so that after about three weeks or more the lepra bacilli are no longer stained by the Ziehl method. This change seems to depend on the action of formal salts of the heavy metals and especially on the acidity of the fixation agent. Carbolic acid retards this alteration of the bacilli so that they can be stained up to 138 days in a carbolic fixation agent.

[Bouin solution contains 1 gm. picric acid in 150 cc. of 80 per cent alcohol 60 cc. commercial formalin 15 cc. glacial acetic acid. The carbolic fixation fluid contains 60 cc. of 80 per cent alcohol 15 gm. phenol 5 cc. commercial formalin, 2 cc. acetic acid.] *L Rogers*

DHARMENDRA. The Immunological Skin Tests in Leprosy. Part I
The Isolation of a Protein Antigen of *Mycobacterium leprae* --
Indian J Med Res 1942 Jan Vol 30 No 1 pp 1-7

1 The main features of the lepromin test (the Mitsuda reaction) are outlined. It is considered that the delay in the appearance of the

classical nodular reaction and possibly the non-specific nature of the reaction may be caused by the nature of the material injected. The need for a refined antigen is stressed.

2 A method for obtaining from excised nodules leprosy bacilli free from tissue is described. Bacilli have been found to be the active constituents of lepromin.

3. The bacilli were ground for several hours in an agate mortar and were fractionated into a saline-soluble portion and an insoluble residue. From the soluble portion, protein and polysaccharide have been obtained. From the insoluble residue various lipid fractions have been separated.

"4 Tests with the different fractions of the bacilli have shown that, of all the fractions isolated, only the protein is definitely antigenic and that it produces only an early reaction.

"5 By extracting the ground bacilli with different solvent three protein fractions—acid-soluble protein, nucleo-protein and alcohol-soluble protein—have been isolated. All the three fractions give rise to early reactions in the neural cases of leprosy.

DHARMENDRA & LOWE (J). The Immunological Skin Tests in Leprosy. Part II. The Isolated Protein Antigen in Relation to the Classical Mitsuda Reaction and the Early Reaction to Lepromin.—*Indian J Med Res* 1942 Jan Vol 30 No 1 pp 9-15 [11 refs.]

"1 The intradermal injections of preparations from leprosy material are capable of causing reactions of three different clinical types. The classical Mitsuda reaction (nodular), the early erythematous reaction preceding the classical reaction, and the erythematous reaction followed by no late reaction.

"2 Since protein is the only definitely antigenic fraction of the *M. leprae* and since all the different types of reaction can be explained on the basis of this one antigen, it is believed they are actually caused by it. If at the time of injection all the antigen is free to act at once only an early reaction is produced. If only part of the antigen is free both early and late reactions are produced, the early reaction by the free antigen and the late by the same antigen which is liberated slowly from breaking down of the injected bacilli. If none of the antigen is free a late reaction only will be produced.

"3 Since late reaction is not produced either by any of the isolated fractions or by the final residue of the bacilli, the idea that the early and late reactions are caused by different antigens is disproved.

Our work however shows the presence of more than one antigen of protein nature.

"4 When compared to the classical Mitsuda test the test with the isolated antigen is found to be at least as sensitive to give results of the same significance and to have great advantages, particularly rapid result and the absence of unpleasant nodules and ulcers. It is, therefore suggested that for performing skin tests in leprosy the isolated antigen may be used in place of ordinary lepromin.

"5 By providing an explanation for the lateness of the reaction the observation reported herein have brought the Mitsuda reaction more in line with the allergic skin tests. The lack of specificity and the negative results in cases of the lepromatous type have still to be explained before the reaction can be admitted as one of specific allergy. Work with the isolated antigen will facilitate a study of these phenomena.

DHARMENDRA & LOWE (J) The Immunological Skin Test in Leprosy
 Part III The Isolated Protein Antigen in Relation to the Antigens
 used by other Workers.—*Indian J Med Res* 1942 Jan
 Vol 30 No 1 pp 17-22. [14 refs]

In this short paper the authors discuss antigens used by other workers in the elucidation of the Mitsuda test That of NAGAI (1938) was made by keeping leprous nodules for long periods in 5 to 10 per cent lecithin or boiling for half an hour in the same solution to produce loss of acid fastness and degeneration into granules Intradermal injections produced similar reactions to those of ordinary lepromin KITANO and INOUE (1941) broke down the lepra bacilli by physical means through the use of ultra-supersonic waves Their lepromin produced stronger early but weaker late reactions than ordinary lepromin very similar to those of the present authors A few other workers have attempted to isolate the antigenic fraction from emulsions made by grinding up lepromatous tissue The active non lipid fraction of VILLELA and his co-workers could not be a protein antigen and it is believed that their methods would neither break down the bacilli nor liberate the antigen HENDERSON (1940) isolated proteins from leprous spleens rich in acid fast bacilli by grinding dried spleen at -70°C This produced only very slight early reactions of the tuberculin type It thus resembles a weak antigen similar to that of the present workers A proteose isolated from the brains of leprous patients by BERNY and MAUZF produced a different reaction from that of a bacillary antigen

L Rogers

DUBOIS (A) Notes pharmacologiques sur le buerre de Caloncoba.
 [The Pharmacology of Caloncoba Butter]—*Ann Soc Belge de Méd Trop* 1940 Sept. 30 Vol. 20 No 3 pp 249-256

PALDROK (A.) Ergebnisse meiner spezifischen Leprabehandlung in Estland in den letzten 20 Jahren. [Results of the Author's Specific Treatment for Leprosy in Esthonia Experience of 20 Years].—*Acta Med Scandinavica* 1941 Vol 108 No 5 pp 374-383 [16 refs]

BURNET (Et) & CABASSO (V) Action de différentes huiles sur le bacille de Stefansky [Action of Oils on the Bacillus of Stefansky]—*Arch Inst Pasteur de Tunis* 1941 Dec Vol 30 No 3-4 pp 203-226

This paper deals with the action of oils on the structure and vitality of the rat leprosy bacillus. The authors use the terms reduced or residual for the granulation and segmentation of acid fast bacilli which may be observed to some extent in the living tissues and more extensively in bacilli preserved outside the body Stefansky's bacillus of rat leprosy retains its vitality in saline up to about one month and its acid fast rod-shaped form for months or even a year If however it is suspended in paraffin oil agglutination is seen in a few days and the organisms become granular and thin Similar changes occur when it is suspended in oil of turpentine from pine trees and also in chaulmoogra oil *in vitro* though more slowly One or two black granules may also appear in them and then tend to break up Inoculation into rats shows that the organism has lost its vitality and power to infect the animals The authors report the experimental inoculation of guineapigs and of rats with both large and small doses of such

classical nodular reaction and possibly the non-specific nature of the reaction may be caused by the nature of the material injected. The need for a refined antigen is stressed.

"2. A method for obtaining from excised nodules leprosy bacilli free from tissue is described. Bacilli have been found to be the active constituents of lepromin.

"3. The bacilli were ground for several hours in an agate mortar and were fractionated into a saline-soluble portion and an insoluble residue. From the soluble portion, protein and polysaccharide have been obtained. From the insoluble residue various lipid fractions have been separated.

"4. Tests with the different fractions of the bacilli have shown that, of all the fractions isolated, only the protein is definitely antigenic and that it produces only an early reaction.

"5. By extracting the ground bacilli with different solvent three protein fractions—acid-soluble protein, nucleo-protein and alcohol-soluble protein—have been isolated. All the three fractions give rise to early reactions in the neural cases of leprosy.

DHARMENDRA & LOWE (J). The Immunological Skin Tests in Leprosy. Part II. The Isolated Protein Antigen in Relation to the Classical Mitsuda Reaction and the Early Reaction to Lepromin. *Indian J Med Res* 1942 Jan Vol 30 No 1 pp 9-15 [11 refs]

"1. The intradermal injections of preparations from leprosy material are capable of causing reactions of three different clinical types. The classical Mitsuda reaction (nodular), the early erythematous reaction preceding the classical reaction, and the erythematous reaction followed by no late reaction.

"2. Since protein is the only definitely antigenic fraction of the *Mycobacterium leprae* and since all the different types of reaction can be explained on the basis of this one antigen, it is believed they are actually caused by it. If at the time of injection all the antigen is free to act at once only an early reaction is produced. If only part of the antigen is free both early and late reactions are produced, the early reaction by the free antigen and the late by the same antigen which is liberated slowly from breaking down of the injected bacilli. If none of the antigen is free a late reaction only will be produced.

"3. Since late reaction is not produced either by any of the isolated fractions or by the final residue of the bacilli, the idea that the early and late reactions are caused by different antigens is disproved.

Our work, however, shows the presence of more than one antigen of protein nature.

"4. When compared to the classical Mitsuda test the test with the isolated antigen is found to be at least as sensitive to give results of the same significance and to have great advantages particularly rapid results and the absence of unpleasant nodules and ulcers. It is, therefore, suggested that for performing skin tests in leprosy the isolated antigen may be used in place of ordinary lepromin.

"5. By providing an explanation for the lateness of the reaction the observations reported herein have brought the Mitsuda reaction more in line with the allergic skin tests. The lack of specificity and the negative results in cases of the lepromatous type have still to be explained before the reaction can be admitted as one of specific allergy. Work with the isolated antigen will facilitate a study of these phenomena.

cause clinical symptoms (2 600 eggs per gm. laid down by KELLER *et al* after a previous survey of the same county in 1930) occurred in 31 per cent of the persons examined.

The incidence of *Ascaris lumbricoides* in 1940 was about half of that in 1913 (49.1 per cent in 1913 and 24.3 per cent in 1940). A reduction in the incidence of this species had occurred in both the mountainous and the non mountainous areas. There had been little change since 1913 in the incidence of *Trichuris trichiura* and *Hymenolepis nana*.

No account was taken of race because the coloured population was too small to be significant. Of the persons examined 27 per cent harboured one only of the four species recorded, 10 per cent harboured two of them, 1 per cent harboured three of them and one or more of the four occurred in 38 per cent. Of the 2 528 persons examined 2 per cent used sewers or septic tanks for excreta disposal, 32 per cent used fly proof privies, 34 per cent had approved facilities and 37 per cent had no facilities at all. More had approved facilities in the non mountainous areas. Among those who had no facilities *N. americanus* occurred 2.6 times as often, *A. lumbricoides* 2.4 times as often and *T. trichiura* 1.8 times as often as among persons with approved facilities.

In a discussion following this paper Keller pointed out that the reduction of 69 per cent in the incidence of *N. americanus* corresponded with the adjusted percentage reduction of 68.3 per cent reported in 1940 from a study of six Southern States. He thought it was due not to treatment because no systematic treatment had been done since 1913 nor to excreta disposal because the provision of facilities for this was too recent but to a natural decline of hookworm in Cocke County. He quoted figures to show that more than a quarter of the white persons harbouring hookworm in the six Southern States referred to have a worm burden high enough to produce clinical symptoms (26.7 per cent have 2,600 or more eggs per gm. of faeces) so that a hookworm control problem exists. He referred to the methods of survey and control suggested by ANDREWS [this *Bulletin* 1942 Vol. 39 p 772]. Dr RICKS suggested that the Faust zinc sulphate centrifugal concentration method should be used instead of the Willis technique. He was not certain that it was better for hookworm but it did reveal other parasites. TUCKER and CHISHOLM think that the Stoll and Hausheer method is not so good for detecting *N. americanus* as the Willis method but that it is better than the Willis method for the detection of *Ascaris* eggs.

G. Lapage

MOHR (Werner) Wurminfektionen bei den zurückgekehrten Afrika Deutschen. Beobachtungen im Tropeninstitut in den Jahren 1936-1940. [Worm Infestations in Germans returning Home from Africa. Observations made in the Tropical Institute (in Hamburg) during the Years 1936-1940.—*Deut Trop Ztschr* 1941 May 15 Vol. 45 No 10 pp 307-315]

An examination in Hamburg of Germans all of whom had lived a long time (often 10 years) in Africa showed that diseases due to helminths were most important. The seamen among these patients were much less heavily infested than the others having had less contact with the sources of infestation on land. Among the helminth infestations hookworm was the most important. The effects of these worms were more severe in the tropical areas which favour the develop-

reduced Stéfanský's bacillus subcutaneously, intraperitoneally and into the testis. The vitality of the bacilli is lost after 3 days in paraffin, 4-7 days in chaulmoogra, but they are living after 23 days in olive oil. When the bacilli impregnated with paraffin or chaulmoogra oil are injected in small doses the development of leprosy lesions is prohibited, but months later acid-fast rod-shaped bacilli are found at the site of injection. After large doses, such as 5 milligrammes of the oil emulsion, the bacilli may be found in internal organs as well as locally and the lesions resemble to some extent those produced by mixtures of tubercle bacilli with oils.

Attempts at treatment of infected mice by subcutaneous injections of living Stéfanský's bacillus, the instillation into the nose or inhalations of the vapour of pine oils, did not modify the course of the disease. Solutions of the bacillus in the oils, freed as far as possible from remaining bacilli by centrifuging, were injected to ascertain the effects of the injection of the soluble portions but no lesions were produced. The experiments on the same lines with guinea-pigs showed that in place of the very slight effects in rats in the case of guinea-pigs Stéfanský's bacillus in oil produces much more marked effects similar to those with other acid-fast bacilli such as tubercle and paratubercle organisms. The authors attribute this to the action of chemical substances common to these acid-fast organisms; the lesions, therefore, cannot be regarded as strictly specific.

L. Rogers

HELMINTHIASIS.

TUCKER (C. B.) & CHISOLM (J. H.). A Study of Intestinal Parasites in Relation to Excreta Disposal Facilities in Cooke County Tennessee, 1940.—*Southern Med J* 1942 May Vol 35 No 5 pp 476-483

Faecal specimens were taken from 10.5 per cent of the population of Cooke County Tennessee to determine the incidence of *Aecator americanus*, *Ascaris lumbricoides*, *Trichuris trichiura* and *Hymenolepis nana*. This population sample corresponded closely to the sample taken from the same county by the Rockefeller Sanitary Commission in 1913. In 1940 1.1 per cent of the people examined (2,528 in all) had egg of *Aecator americanus*, a proportion 69 per cent lower than that found in 1913. Probably the reduction was greater still, because in 1913 the simple meat method of examination was used while in 1940 the Willis salt floatation method was used and, when *Aecator americanus* was found egg counts were done by the Stoll and Hausheer small drop dilution method. The smear method probably missed a proportion of infestation. Infestation with *A. americanus* occurred 4.9 times as often in the mountainous eastern half of the county where sandy-clay to sandy soil predominate as in the non-mountainous western half where clay soils predominate. In 1913 the prevalence of *A. americanus* was 2.5 times as great in the mountainous half. Thus there was a greater decrease in the non-mountainous area, which the authors ascribe to the differences in the soil and to greater improvements in education, sanitation and economic conditions in the non-mountainous area. Infestations with *A. americanus* high enough to

cause clinical symptoms (2 600 eggs per gm laid down by KELLER *et al* after a previous survey of the same county in 1930) occurred in 31 per cent of the persons examined

The incidence of *Ascaris lumbricoides* in 1940 was about half of that in 1913 (49.1 per cent. in 1913 and 24.3 per cent in 1940). A reduction in the incidence of this species had occurred in both the mountainous and the non mountainous areas. There had been little change since 1913 in the incidence of *Trichuris trichiura* and *Hymenolepis nana*.

No account was taken of race because the coloured population was too small to be significant. Of the persons examined 27 per cent harboured one only of the four species recorded, 10 per cent harboured two of them, 1 per cent harboured three of them and one or more of the four occurred in 38 per cent. Of the 2 528 persons examined 2 per cent used sewers or septic tanks for excreta disposal, 32 per cent used fly proof privies, 34 per cent had approved facilities and 37 per cent had no facilities at all. More had approved facilities in the non mountainous areas. Among those who had no facilities *N. americanus* occurred 2.8 times as often, *A. lumbricoides* 2.4 times as often and *T. trichiura* 1.8 times as often as among persons with approved facilities.

In a discussion following this paper KELLER pointed out that the reduction of 69 per cent in the incidence of *N. americanus* corresponded with the adjusted percentage reduction of 68.3 per cent reported in 1940 from a study of six Southern States. He thought it was due not to treatment because no systematic treatment had been done since 1913 nor to excreta disposal because the provision of facilities for this was too recent but to a natural decline of hookworm in Cocke County. He quoted figures to show that more than a quarter of the white persons harbouring hookworm in the six Southern States referred to have a worm burden high enough to produce clinical symptoms (26.7 per cent have 2 600 or more eggs per gm of faeces) so that a hookworm control problem exists. He referred to the methods of survey and control suggested by ANDREWS [this *Bulletin* 1942 Vol 39 p 772]. Dr RICKS suggested that the Faust zinc sulphate centrifugal concentration method should be used instead of the Willis technique. He was not certain that it was better for hookworm, but it did reveal other parasites. TUCKER and CHISHOLM think that the Stoll and Hausheer method is not so good for detecting *N. americanus* as the Willis method but that it is better than the Willis method for the detection of *Ascaris* eggs.

G Labage

MOHR (Werner) Wurminfektionen bei den rückgekehrten Afrika Deutschen. Beobachtungen im Tropeninstitut in den Jahren 1936-1940. [Worm Infestations in Germans returning Home from Africa. Observations made in the Tropical Institute (in Hamburg) during the Years 1936-1940.—*Deut Trop Ztschr* 1941 May 15 Vol 45 No 10 pp 307-315]

An examination in Hamburg of Germans all of whom had lived a long time (often 10 years) in Africa showed that diseases due to helminths were most important. The seamen among these patients were much less heavily infested than the others, having had less contact with the sources of infestation on land. Among the helminth infestations hookworm was the most important. The effects of these worms were more severe in the tropical areas which favour the develop-

"reduced Stéfan's bacillus subcutaneously intraperitoneally and into the testis. The vitality of the bacilli is lost after 3 days in paraffin, 4-7 days in chaulmoogra but they are living after 23 days in olive oil. When the bacilli impregnated with paraffin or chaulmoogra oil are injected in small doses the development of leprosy lesions is prohibited, but months later acid-fast rod-shaped bacilli are found at the site of injection. After large doses such as 5 milligrammes of the oil emulsion the bacilli may be found in internal organs as well as locally and the lesions resemble to some extent those produced by mixtures of tubercle bacilli with oil.

Attempts at treatment of infected mice by subcutaneous injections of living Stéfan's bacillus, the instillation into the nose or inhalations of the vapour of pine oils did not modify the course of the disease. Solutions of the bacillus in the oil freed as far as possible from remaining bacilli by centrifuging were injected to ascertain the effects of the injection of the soluble portions but no lesions were produced. The experiments on the same lines with guinea-pigs showed that in place of the very slight effect in rat in the case of guinea-pigs Stéfan's bacillus in oil produces much more marked effects similar to those with the acid fast bacilli such as tubercle and paratubercle organisms. The authors attribute this to the action of chemical substances common to these acid fast organisms; the lesions therefore cannot be regarded as strictly specific.

L. Rogers

HELMINTHIASIS

TUCKER (C. B.) & CHESCOM (J. M.). A Study of Intestinal Parasites in Relation to Excreta Disposal Facilities in Cooke County, Tennessee, 1940.—*Southern M. J. J.* 1942 May Vol 35 No 3 pp 478-483

Faecal specimens were taken from 10.5 per cent of the population of Cooke County, Tennessee to determine the incidence of *Necator americanus*, *Ascaris lumbricoides*, *Trichuris trichiura* and *Hymenolepis nana*. This population sample corresponded closely to the sample taken from the same county by the Rockefeller Sanitary Commission in 1913. In 1940 11 per cent of the people examined (2,528 in all) had eggs of *N. americanus* a proportion 69 per cent lower than that found in 1913. Probably the reduction was greater still, because in 1913 the simple smear method of examination was used, while in 1940 the Willis salt flotation method was used and when *Necator americanus* was found egg counts were done by the Stoll and Hansheer small drop dilution method. The smear method probably missed a proportion of infestation. Infestation with *N. americanus* occurred 4.9 times as often in the mountainous eastern half of the county where sand-clay to sand-silt predominate as in the non-mountainous western half, where clay soils predominate. In 1913 the prevalence of *N. americanus* was 2.5 times as great in the mountainous half. Thus there was a greater decrease in the non-mountainous area, which the authors ascribe to the differences in the soil and to greater improvements in education, sanitation and economic conditions in the non-mountainous area. Infestations with *N. americanus* high enough to

Treatment of hookworm infestation was carried out with ascaridol which could cause urticaria and a high eosinophilia possibly due to the release of increased amounts of toxin from the dead worms.

Hookworm infestations were also treated with oil of chenopodium secretin or the combination of ascaridol and secretin called Bedermin. Enterobius infestations were treated with Lubisan tapeworms were treated with extract of *Gilix mas* with atropin half an hour before it was given. For *Schistosoma mansoni* and *S. haematobium* founadin was used or intravenous injections of 1 per cent solution of Tartarus stibiatus [tartar emetic] in doses of 6 cc rising to 15 cc with a total dose of not more than 1.3-1.5 gm. Filaria infestations were not treated.

G. Lapage

DAVEY (D. G.) & INNES (J. R. M.) The Present Position of Phenothiazine as an Anthelmintic—*Vet Bull* 1942 Aug Vol. 12 No 8 pp R7-R14 [97 refs.]

This article is a valuable summary of the experience so far gained in the use of phenothiazine in animals and man. It should be read in its entirety but for readers of this *Bulletin* the following extracts are of main interest. Much of the work referred to has already been abstracted in this *Bulletin* but it is useful to bring the experiences together.

Specific Anthelmintic Action of Phenothiazine

(8) *In Man*—Manson Bahr (1940) was the first to try phenothiazine as an anthelmintic in human beings. He used it in three patients with *Ancylostoma duodenale* in nine patients with *Ascaris lumbricoides* and in nine patients with *Enterobius vermicularis*. His results against the hookworm were entirely negative even with a dose as high as 30-40 g. Against *Ascaris* some degree of positive action was obtained: two patients given 8 g daily for three days followed by a dose of Glauber's salt were completely freed of the worms but from seven others, given doses of 16-48 g only one round worm was recovered. Against *Enterobius* the results were very good all the patients being cured. The doses advised against this worm were —2 g per day for seven days to children under eight years of age half this dose for children under four and 8 g per day for five days to adults. We now know that these doses are too high to be generally recommended.

Kuitunen Ekbaum (1941) gave phenothiazine to 89 children and nine adults for the treatment of enterobiasis. The doses were 4-5 g for children 2-5 years old 6 g for those 6-8 years old and 8 g for those nine years and over. A dose was apparently spread over 4-6 consecutive days so that each child received 1 g or less of the drug per day. It will be noticed that the dose for the first age group is about the same as that recommended by Manson Bahr but that for the second age group is at the most, half of the Manson Bahr dose and that for the third group is only a fifth of it. The drug was administered to children in the food (in porridge or cereals) and to adults either in water or in capsules. No laxative was given. Of the 89 children and nine adults treated 76 children and eight adults were cured by the first course of treatment the remainder except for one child responded to a second course. No toxic effects of the treatment were observed.

Hubble (1941) also showed that phenothiazine in a dose of 1 g per 10 lb body weight spread over 3-5 days is an effective remedy against *Enterobius* but it is a remedy which is probably too dangerous to be used in the routine treatment of this worm. He makes this conclusion because, out of the 30 or so cases which he treated three developed haemolytic anaemia. His warning seems to have been justified for a case

ment of these nematodes. When infestations were light symptoms were often slight or absent. Other patients complained of occasional pains mostly in the right epigastrium and of abdominal discomfort. More severe infestations caused symptoms of anaemia. Severe infestations were rare and the severest form of the disease was never found. The relative absence of symptoms is explained by the blood examinations done on 61 out of 133 patients: the haemoglobin percentage was 80-100 in 37 of these 70-80 in 18 60-70 in 6 and below 50 in 2 one of these latter having malaria also. Heavier infestations and more severe anaemia were found in patients returning from Brazil.

In children returning from Africa Mohr never found the devastating consequences of hookworm infestation seen in children returning from South America: the latter were very backward, both mentally and physically, children seven years old being not much bigger or mentally more advanced than normal children three years old. Mohr ascribes this difference to the fact that German settlers in Brazil and South America get an insufficient living in tropical and subtropical climates, while Germans in Africa are mostly farmers better versed in rules of health. All other helminth infestations were less important but could cause serious disease.

Taenia saginata was the next most common helminth found, occurring chiefly in Germans from East Africa, where as WETZEL pointed out in the subsequent discussion of Mohr's paper the cattle are heavily infested with this parasite. Out of 45 human infestations only three were in children or persons under 20. Only one patient had *T. solium* and one had *Hymenolepis nana*. An interesting detail is the fact that two of the patients had more than one tapeworm, two being present in each of them. Ascari and Enterobius were not so common as tapeworms and occurred chiefly in children. Trichuri eggs were often found but the infection did not cause any symptoms.

Schistosoma mansoni and *S. haematobium* were more important than the four worms just mentioned. Both were repeatedly diagnosed, but infestation was slight: there was only one severe case which came from North Africa: all the others came from East Africa and Angola and they were comparatively light. *S. mansoni* occurred only in cases from E. Africa.

Filarial infestations were found in people from the Cameroon, Fernando Po and Spanish Guinea. *Leishmaniochilomonas perstans* seemed to be moderate.

A history of Calabar swelling (*Loa loa*) was found in one series of patients and these showed a high eosinophilia without microfilariae in the blood. Occasionally Calabar swellings were still present. Complement fixation and skin tests were done but these were not very specific being positive also when high hookworm infestations were present.

Only one case of Guinea worm was seen, the patient being a native from the west coast of Africa: the worms were encapsulated and calcified in the muscles of the back and scrotum and the X-ray diagnosis was confirmed by autopsy.

Eosinophilia was often found when no worms were present. Light infestations sometimes showed a high eosinophilia and heavy ones a low eosinophilia.

Infestation with Trichuris showed only a slight eosinophilia or none at all.

Treatment of hookworm infestation was carried out with ascaridol which could cause urticaria and a high eosinophilia possibly due to the release of increased amounts of toxin from the dead worms.

Hookworm infestations were also treated with oil of chenopodium secretin or the combination of ascaridol and secretin called Bedermin. Enterobius infestations were treated with Lubisan tapeworms were treated with extract of *Filix mas* with atropin half an hour before it was given. For *Schistosoma mansoni* and *S. haematobium* foudadin was used or intravenous injections of 1 per cent solution of Tartarus stibiatus [tartar emetic] in doses of 6 cc rising to 15 cc with a total dose of not more than 1.3-1.5 gm. Filaria infestations were not treated.

G Lapage

DAVEY (D G) & INNES (J R M) The Present Position of Phenothiazine as an Anthelmintic.—*Vet Bull* 1942 Aug Vol 12 No 8 pp R7-R14 [97 refs]

This article is a valuable summary of the experience so far gained in the use of phenothiazine in animals and man. It should be read in its entirety but for readers of this *Bulletin* the following extracts are of main interest. Much of the work referred to has already been abstracted in this *Bulletin* but it is useful to bring the experiences together.

Specific Anthelmintic Action of Phenothiazine

(8) *In Man*—Manson Bahr (1940) was the first to try phenothiazine as an anthelmintic in human beings. He used it in three patients with *Ancylostoma duodenale* in nine patients with *Ascaris lumbricoides* and in nine patients with *Enterobius vermicularis*. His results against the hookworm were entirely negative even with a dose as high as 30-40 g. Against *Ascaris* some degree of positive action was obtained: two patients given 8 g daily for three days followed by a dose of Glauber's salt were completely freed of the worms but from seven others, given doses of 16-48 g only one round worm was recovered. Against *Enterobius* the results were very good, all the patients being cured. The doses advised against this worm were —2 g per day for seven days to children under eight years of age, half this dose for children under four and 8 g per day for five days to adults. We now know that these doses are too high to be generally recommended.

Kuitunen Ekbaum (1941) gave phenothiazine to 89 children and nine adults for the treatment of enterobiasis. The doses were 4-5 g for children 2-5 years old, 6 g for those 6-8 years old and 8 g for those nine years and over. A dose was apparently spread over 4-6 consecutive days so that each child received 1 g or less of the drug per day. It will be noticed that the dose for the first age group is about the same as that recommended by Manson Bahr but that for the second age group is at the most, half of the Manson Bahr dose and that for the third group is only a fifth of it. The drug was administered to children in the food (in porridge or cereals) and to adults either in water or in capsules. No laxative was given. Of the 89 children and nine adults treated 76 children and eight adults were cured by the first course of treatment, the remainder except for one child responded to a second course. No toxic effects of the treatment were observed.

Hubble (1941) also showed that phenothiazine in a dose of 1 g per 10 lb body weight spread over 3-5 days is an effective remedy against *Enterobius* but it is a remedy which is probably too dangerous to be used in the routine treatment of this worm. He makes this conclusion because out of the 30 or so cases which he treated three developed haemolytic anaemia. His warning seems to have been justified for a case

has been reported (1942 *Lancet* 242, 86) in which a girl of six years died of acute haemolytic anaemia after taking phenothiazine. It had been advised to give the girl a $\frac{1}{2}$ g tablet four times a day—three tablets were taken on the first day—four on each of the next three days and two on the fifth day—a total dosage of 8.5 g. She became ill on the fifth day with slight facial icterus and headache and on the tenth day she was admitted to hospital with slight jaundice, a rapid pulse and a temperature of 101 F. A blood examination showed red cells 1,250,000 haemoglobin 28%, white cells 16,850 normoblasts 1%, reticulocytes 22.6%, platelets 236,000 per cu mm. A drip transfusion of 10 oz whole blood given the day after admission was followed by a rigor, a rise of temperature to 106.8 F and a pulse rate of 180. She died about 12 hours after the transfusion.

Elliot (1942) has recorded an interesting and successful treatment of dracunculiasis with phenothiazine. A warm olive oil suspension of the drug is injected intramuscularly as near the course of the worm as possible. Two or three sites are injected with $\frac{1}{2}$ –1 g of phenothiazine and treatment may be repeated at weekly intervals. No toxic effects have been encountered even when as much as 8 g (2 g at weekly intervals) has been given.

Toxic Effects in Human Beings—The earliest report of a toxic action of phenothiazine on human beings seems to be that of DeBds, Stockton and Thomas (1939) who were using the drug as a urinary antiseptic. Three of their patients after receiving 19.9 g, 22.4 g and 28.1 g spread respectively, over 8, 10 and 67 days developed secondary anaemia. Hubble (1941) also showed that phenothiazine might produce haemolytic anaemia in children. He treated some 30 cases for enterobiasis and three of them developed anaemia and toxic hepatitis. Johnston (1942) described a case of toxic effect in a girl aged seven who was given 1 g phenothiazine twice daily for five days. Treatment was followed by collapse, slight icterus, delirium, fever and increased pulse rate and anaemia. Blood transfusion was resorted to and the girl recovered. Finally there is the fatal case already mentioned—after autopsy it was considered that the appearance of the blood, spleen and marrow were consistent with a haemolytic anaemia.

Sections of liver, heart and kidneys showed no macroscopical evidence of toxic damage and there was nothing to connect the blood transfusion with death. Thus eight patients out of a total of about 220 have exhibited toxic effects following treatment with phenothiazine.

An interesting effect of the drug on men exposed to the sun—who were using a suspension of the substance as a spray in the control of codling moth has been described by Newcomer (1937) and DeBds, Wilson and Thomas (1940). Some of the men complained of an intense itching, irritation and reddening of the skin—effects which sometimes approximated to those of severe sunburn. DeBds and his co-workers suggest that it is due not to a local irritant action of phenothiazine but to a photosensitization produced directly or indirectly by the presence of the oxidation-reduction system thional-leucothionol, in the tissues. The presence of this system in the tissues would be the result of the oxidation of phenothiazine taken in through the mouth.

C. W.

SCHNITZER (R. J.) SIEBENMANN (C.) & BETT (H. D.) *Chemical and Toxicological Studies on Phenothiazine*.—*Canadian Public Health J.* 1942 Jan Vol 33 No 1 pp 17–24 [16 refs.]

After briefly describing phenothiazine and its purification by recrystallization from toluene and benzene the authors give what they regard as a better and cheaper method of purification by precipitation in the presence of a stabilizing reducing agent. A 20 per cent. solution

of commercial phenothiazine in cold acetone is treated with charcoal for 30 minutes and then filtered into twice its volume of 1 per cent sodium formaldehyde sulfoxylate. The immediate microcrystalline precipitate must be dried completely (in a vacuum oven at 60°C) or it will not be stable.

Phenothiazine thus purified was given as a suspension in gum acacia to white mice by the mouth to test its toxicity. After the administration of 5 gm per kgm. mouse weight as a single dose or of 16 daily doses of 1.25 gm per kgm (20 gm in all) there were no ill effects clinically or at autopsy. There was no anaemia.

Guinea-pigs did not tolerate the drug so well. Repeated daily doses of 2 gm per kgm. given as a 10 per cent suspension or in 10 per cent aqueous polyvinyl alcohol caused a loss of weight. During one experiment the hair on the feet, legs and abdomen fell out. The haemoglobin never fell below 70 per cent (Sahli).

In dogs anaemia was produced but it was transient. One dog weighing 10.5 lb was given four daily doses of 5 gm. The haemoglobin was 130 per cent before treatment and fell to 40 per cent after it and then increased to 100 per cent four weeks after the beginning of treatment. The dog was very lively throughout and gained 4.5 lb in weight. Two other dogs weighing 15.5 lb and 20 lb were given a total of 48 gm each in six daily doses of 5 gm followed by four daily doses of 2 gm. Marked anaemia followed with anisocytosis, poikilocytosis and numerous nucleated red cells. The haemoglobin of the dog weighing 15.5 lb was 110 per cent before treatment and it fell to 20 per cent with 1.35 million red cells and 25 per cent of reticulocytes at the height of the anaemia. This dog was very weak but the symptoms disappeared when the dose was reduced to 1 gm a day. After the total of 48 gm had been given its haemoglobin had risen to 37 per cent and the red cells to 3.13 millions. The haemoglobin of the dog weighing 20 lb was 80 per cent before treatment began and it fell to 35 per cent with 2.06 millions of red cells. After the total of 48 gm had been given the haemoglobin was 50 per cent and the red cells 2.7 millions. After four days of rest both dogs were given an additional 4 gm daily until 64 gm had been given; each had then had 112 gm. But anaemia could not again be produced by this second course of the drug during which the lowest haemoglobin value of the dog weighing 15.5 lb was 37 per cent and lowest haemoglobin value of the dog weighing 20 lb 53 per cent. Six days after the last dose these haemoglobin values were 55 and 75 per cent, respectively. At the end of the experiment the weights of the dogs were practically the same as at the beginning.

The low toxicity of phenothiazine is due to its rapid elimination. Reviewing the literature the authors refer to the statement of SWALES and COLLIER that 50 per cent. of the phenothiazine given is excreted unchanged in the faeces. Most of the remainder is excreted in the urine in an oxidized form which is also found in the blood, the concentration curve in the blood being almost parallel to that in the urine. The authors determined the total amount of phenothiazine derivatives in the urine by diluting 1 cc of urine with 7 cc of water adding 1.5 cc of conc. HCl and 0.5 cc of 30 per cent hydrogen peroxide. After standing for 20 minutes the thionol formed in this mixture is estimated by comparing its colour with that of solutions of thionol of known strength. They found that a single dose of 1.5 gm of phenothiazine is almost completely eliminated in 54 hours, most of it being eliminated

in the first 8 hours with a second peak at 25-30 hours after 4-5 days no more of the drug could be detected. After 5.5 gm given over 4 days, elimination was complete 6 days after the last dose the bulk being excreted before the fourth day

G Lapage

HUMPHREYS (D R) Death from Phenothiazine Poisoning.—*Lancet* 1942 Jul 11 pp 39-40

This is apparently an account of the same case as that reported in the *Lancet* 1942 Jan 17 p 86 (See this Bulletin 1942, Vol. 39 p 193)

C II

ESKOLA (O) Leber die Giftigkeit der Wurmmittel im Lichte von Bilirubinuntersuchungen (On the Toxicity of Worm Remedies in the Light of Bilirubin Investigations).—*Acta Med Scandinavica* 1941 V 1109 Nos 5-6 pp 548-565 With 8 figs

Eskola treated 40 people in whose faeces worm eggs (presumably *ascaris* or *ascaris*) had been found or who had been treated for worms (unspecified) with Filix mas Gland kamala Semina cucurbitae or Extr aspidi spinulosi with castor oil or magnesium sulphate as aperients. A few said that they had had worms, although no worm eggs could be found in their faeces. All were free from other disease special care having been taken to exclude affections of the liver and the blood.

Eskola believes in spite of the comparative scarcity of his material that 3.5 gm of Filix mas or of Extr aspidi spinulosi 10 gm of Gland kamala or 150-200 Semina cucurbitae suffice for the expulsion of worms (presumably the author means tapeworm only). No bilirubin or urobilin was found in the urine of any of the patients and urobilinogen was present only in slight amount in a few of the urine tests. Stacterus was present in only one patient. Most worm remedies increase the colour and bilirubin content of the serum temporarily and parallel action of the worm remedies on the liver cells hinders the excretion of blood pigment. The composition of male fern and its toxicity are discussed. To the host Extr filix is the most toxic of the remedies used, Extr aspidi spinulosi is less toxic and Gland kamala only slightly so. Semina cucurbitae are relatively non-toxic. The toxicity is rather greater if castor oil is used as an aperient than if magnesium sulphate is used. While 3.5 gm of Extr filix or Extr aspidi spinulosi seem only slightly toxic to patients the addition of only 0.5 g of Filix mas to the dose increases its toxicity relatively strongly. GÄRTNER on the other hand gives 8-10 gm of Filix mas as the suitable dose and CLOETTA states that more than 8 gm. should not be given. The use of 3.5-4 gm in Finland is explained by the higher content of the active principle in the Finnish male fern. Prolonged administration of atophan to 4 patients in daily doses of 1.5-3.0 gm did not cause any increase in the pigment and bilirubin content of the blood. Other authors quoted by Eskola have stated that intravenous injection of atophan increases the bile pigment in the gall bladder by its direct action on the liver cells.

G Lapage

SCOTT (J Allen) The Epidemiology of Schistosomiasis in Venezuela
—*Amer J Hyg* 1942. May Vol. 35 No 3 pp 337-366
With 2 figs [25 refs]

This is one of a series of papers recording the results of the author's investigation done at the request of the Venezuelan Government of schistosomiasis (*S. mansoni*) in Venezuela. After working for three years the author concludes that schistosomiasis is one of the most important public health problems there. It is at present impossible to assess its seriousness accurately but a rough estimate puts the number of infested persons at 30 000. In the different communities examined various grades of infestation were found in some places about 25 per cent of the population were infested in other areas all the people had become infested by the age of 5-10 years.

Detailed data about the geographical distribution of the disease are still being collected but enough information has been obtained to show that schistosomiasis is restricted to one endemic area only namely the central part of the northern coastal range. The reason for this is apparently the limited distribution of the intermediate host the planorbid snail *Australorbis glabratus* (*Planorbis guadeloupensis*). No new foci of first-class importance are likely to develop unless the snails become more widely distributed and the practice of irrigation extends.

The conditions favourable to the snail can usually be recognized by an experienced observer. The snail must have either one long period of water in ditches irrigation canals etc. to enable a new generation to grow up sufficiently to withstand natural drying up of its environment or the young snails must have protection against the dry periods which occur when irrigation canals are not used every day. They withstand slow natural drying quite well and survive in canals used only a few days each week but do not survive in appreciable numbers when the canals dry up quickly and completely between irrigation periods. Most snails are found in stagnant water in residual pools left after the use of irrigation canals and in slow moving water. If the local soil allows the growth of large aquatic plants these help the snails by reducing the speed of the water currents and by providing food for them. Where the large plants are cleared the snails may still be abundant feeding on algae on the sides and bottoms of the canals.

Infestation of human beings seems to be at least as severe as the author found it to be in the peasants of Egypt. Infestation is commonest where sugar cane is irrigated in the broad portions of the mountain valleys. Wherever in this region the occurrence of sandy well-drained soil does not favour the snails the infestation does not exist. Although the snails occur in Lake Valencia few people make contact with the water of this lake and where they do the vegetation has been cleared from the shores and no snails are found there.

Elsewhere in every rural community where snails exist at least a quarter of the population are infested. In most places nearly all the men and three-quarters of the women are infested, because the men have prolonged and more frequent contact with snail infested water in the fields. Pollution of this field water by defaecation is widespread near the houses deposited faeces are washed by the rain into the canals. It therefore happens that wherever snails occur near houses virtually all the women are as highly infested as the men and the children acquire early infestation. Such communities harbour large numbers of worms. Persons infested early in life go on passing eggs for the rest of their lives.

become normal and lay eggs two weeks later. In water containing 20 per cent of artificial sea water they do not feed or lay eggs but they can live for about 35 days. When eggs laid in fresh water are put into water containing 25 per cent of sea water they do not develop.

In nature *P. glabratus* withstands a day temperature which is often above 37°C but during the night or in pools that are shaded for part of the day the temperature falls to about 25°C and the snails can recover from effects of heat. In the laboratory a constant temperature of 37°C. kills the snails in 3 to 4 days even if they have been gradually accustomed to it. From a continuous temperature of 32-33°C they still suffer eating little and not laying eggs but a temperature of 33 or 37°C for only a part of the day does not prevent them from living and laying eggs normally. When they emit cercariae they are much more sensitive to the action of solar heat. They rarely have to experience cold in nature and do not resist it well. Specimens of all ages taken gradually down to 4 to 5°C died in four to five days. At 10°C they live but do not feed and group themselves in voluminous masses. At 15°C they feed much less than at higher temperatures. The optimum temperature for cultures is 25-30°C.

In nature they often withstand the drying up of the drainage canals in the plantations. Out of 192 snails taken from a canal at Villa de Cura in Venezuela which had been completely dried for more than a week [a photograph of this canal is given] 25 per cent revived. But of 95 specimens rather smaller in size taken on November 6th in the dried clay of Caracas and put in water in Paris on December 4th (28 days later) 30 were still alive and laid eggs a few days later but none emitted cercariae of *S. mansoni* a fact which suggests that infested planorbids resist drying less efficiently. The dried planorbids became active one or two hours or rarely 24 hours after they were put in water at 28-30°C. In the laboratory 21 out of 44 snails resisted 50 days of drying more severe than is encountered in nature where the humidity of the subsoil accidental rain etc. may prevent complete desiccation. Probably in nature they can live much longer under dry conditions when they are sheltered by vegetation in this respect they resemble *P. boissyi* in Egypt which can according to BARLOW resist drying in nature for at least two months and for about six months in the laboratory in metal boxes with a little dry earth. When they are dried up the snails inhabit the bottom of the shell where the body is reduced to a sixth or a seventh of its normal volume.

Planorbids parasitized with cercariae are less resistant to drying. Barlow showed that this was true of *P. boissyi* in Egypt infested with *S. mansoni* and CORR demonstrated it for *Oncomelania nosophora* infested with *S. japonicum*. Brumpt showed that it is also true of *P. glabratus* and thinks it certain that the larval schistosomes damage the snails. Out of 150 specimens collected at Guadeloupe on July 22nd, 1939 of which 30 per cent were infested when they were examined in Colombia on August 14th, only 30 survived and these were not infested.

Erosion of the shells in the form of circular or linear erosions of a pearly colour on the olive green or brown shell were always present being most numerous on the older coils at the centre of the shell where actual perforations may occur. These were seen in cultures in the laboratory as well as in snails collected in the field but in cultures they were present only when several snails were cultured together. Brumpt has found similar erosions on the shells of *Planorbis erussius* individuals of which species browse on each other's shells and damage

em In these experiments with *P. crustus* corrosive action of the water was eliminated and Brumpt seems to think that the most likely explanation is that algae and related organisms extend the damage done by the snails themselves to each other's shells.

Reproduction—Copulation is easily observed the snails uniting unilaterally in chains the middle snail of three acting as female to the first one and as male to the one behind it the process may continue for a long time but towards the third day sexual excitement seems to die away and after that only rare brief pairing occurs. Discussing the question of self fertilization in pulmonates Brumpt gives his own illustrations of the eggs of *Bulinus contortus* showing eggs with two polar bodies, the presence of which necessitates the view that they must be fertilized by a sperm. He gives a table of all the Basommatophora in which self fertilization has been proved this includes *Bulinus contortus*, *Planorbis glabratus* and *P. boissyi*. The fecundity of different individuals of *P. glabratus* of the same size and kept under the same conditions varied greatly, but snails 65 days old at the end of one experiment laid an average of 233 eggs per egg mass and 179 snails laid 4171 eggs. The rhythm of egg laying was not regular some laid almost every day for several days stopping for two or three days and beginning again others laid two or three egg masses a day and then stopped for several days. Some egg masses that were apparently abnormal did not develop and some eggs in fertile egg masses did not develop. The egg mass is like that of other planorbids flat and oval with a hilus indicating the beginning and end of the whitish egg ribbon. The eggs are in one plane compressed against each other in rows of one two three or four according to the age of the snails and are covered by a resistant elastic capsule with a horny colour. The number of eggs varies with the size of the snail. A snail of medium size (24 mm) lays first masses which hold 5-20 eggs. Normally egg masses are laid quickly (in 3-5 minutes) and at night. The snails will not lay in water containing gases of putrefaction but they lay in less than an hour after they are put into fresh water. In nature the egg masses are generally laid on plants and various solid bodies and on the shells of other planorbids. In cultures they will be laid on cellophane or cover slips and can then be examined on these or on the walls of the glass container when 90 per cent of them are laid at the level of the water or within its upper third. The optimum temperature for egg laying is 20-25°C it ceases at temperatures above 30°C and below 15°C. Lowering the temperature stimulates the deposition of eggs. The volume of water present has no influence on egg laying the effect of brackish water has already been noted. When individuals are isolated they lay rather more egg masses. Infestation with larval stages of *S. mansoni* effectively reduces the egg-laying capacity during the first few days of parasitism they lay as many eggs as the uninfested controls towards the tenth day even when tentacular lesions exist the egg-laying continues but towards the 18th day at the moment when the daughter sporocysts emigrate egg-laying practically ceases and occurs only rarely during the emission of cercariae. Complete castration due to the presence of parasites was never seen in spite of the abundance of sporocysts and cercariae in the genital glands. Eggs become rarer and rarer as spermatogenesis continues and sperms are numerous. Cercariae occur inside the eggs and figures of them in this situation are given. Inside the eggs they live for a maximum of 24-36 hours and their bodies are eaten by the young snails when these develop. The pres

of living or dead cercariae in the eggs does not as a rule seem to damage the development of the young snails although the active movements of cercariae may damage the segmenting eggs and this may perhaps produce monstrosities. Their presence in the eggs shows that they use the female genital ducts as a means of getting out as well as other routes. A heavily infested egg mass was found laid in water which did not contain any cercariae so that the cercariae found in eggs had not entered them after they had been laid further when cercariae penetrate anything they drop their tail appendage and this is always present on those found inside eggs when millions of cercariae were given the opportunity to penetrate egg masses they showed no attraction to these and did not try to penetrate them.

P. glabratus when they have at the age of 6 weeks reached only half their average diameter (10-11 mm mature individuals reach 24-26 mm) may lay eggs and they seem to go on doing so until they die. At 25°C in cultures they can lay during an average of 15 months about 20 egg masses of 50-80 eggs per month this amounts to about 20 000 eggs during their lifetime. But natural enemies in nature control this multiplication. When the water is often renewed to prevent the depredations of infusoria rotifers oligochaetes and various crustacea 85 or even 100 per cent of the eggs may hatch. Resistance of the eggs to drying varies according to the stage of evolution of the egg. Eggs laid outside the water in a tube died in 2-3 days. Eggs laid in fresh water and taken gradually into water containing 25 per cent. of sea water did not develop. Eggs in a humid atmosphere in a tube kept at 25°C continued part of their development and the embryos emerged when water was added, but young eggs did not develop. Snails isolated from birth developed much quicker than those that were kept in communities. The extent of the water surface does not seem to affect the rate of growth because snails isolated in tubes are always bigger than others kept in communities in larger vessels. Reproduction occurred at all times of the year at 25°C and 6 generations a year are possible.

In Venezuela intestinal bilharzia is localized and only some 20 000-25 000 persons are infested but in Brazil Guana and the Antilles several millions are probably infested. Natural infestation of *P. glabratus* is sometimes intense it may reach the degree of experimental infestation which is often 100 per cent but sources of infestation vary so much that areas are often found where no snails are infested and others where the infestation is high. Brumpt published in 1940 his work on the evolution of the parasite in the snail which completed the work of LEIPER LUTZ LAMPE and FAUST and HOFFMANN. Here he gives figures of the presence of cercariae in the tentacles which show that emigration of the daughter sporocysts into the hepato-pancreas although normal is not necessary.

A section on methods to be used for the destruction of the snails completes the paper. These include the removal of useless collections of water regular pumping drainage control of irrigation canals and the covering of canals and drains where possible. Sea water could be used but if it is to be successful it must act for several successive days at a temperature of 35-40°C. Copper sulphate carbonate of copper quick lime and ammonium sulphate could be used because all molluscs are susceptible to the action of these. Among biological methods alternate drying and filling of the canals every 15 days is not effective as the above study of the resistance of the snails to drying shows. It is

better to help the multiplication of their natural enemies. These are considered in turn but among them ducks appear to be the only ones likely to be of practical value. No parasitic trematode is known that can castrate the snails completely.

G. Lapage

ZELLWEGER (Hans) Ueber die durch *Schistosomum intercalatum* hervorgerufene Intestinal-Bilharziose im Gabon [Intestinal Bilharzia in Gabon due to *Schistosoma intercalatum*].—Arch. f. Schiffs u. Trop. Hyg. 1940 Nov. Vol. 44 No. 11 pp. 507-520. With 3 figs & 1 map. [12 refs.]

Intestinal bilharzia caused by *Schistosoma intercalatum* is more frequent in Gabon than it was formerly thought to be. Its distribution is bound up with the course of the River Ogowé and its communicating tributaries and lakes. A description of these is given with a map illustrating the area investigated by the author from his base at Lambaréné. The heaviest infestation occurs on the River Ogowé between N'Djolé and Achouka about 100 km. above the entry of the Ogowé into the Atlantic including the tributaries and communicating lakes in this area. No certain cases were found above N'Djolé. The question whether the infested area in Gabon is connected with the area of the Belgian Congo also infested with *S. intercalatum* is discussed. CHOUBERT thought that all the geological and petrological evidence suggested that the river Congo once flowed through the bed of the Ogowé. Zellweger thinks that the more rapid current in the river Ogowé in its upper half above N'Djolé may prevent the intermediate host from breeding in these upper waters and may confine it to the slower waters of the infested area defined above.

Hospital work left no time for a study of the intermediate host, which is in the Belgian Congo according to VAN DEN BERGHE. *Physopsis globosa*. Zellweger found *Physopsis africana* in Lake Ziké one of the lakes in the most heavily infested area.

Tables are given showing the frequency of the occurrence of the parasite. In the hospital 153 cases were found among 21,128 patients between 1931 and 1937 while between October 1937 and April 1939 there were 274 cases among 6,560 patients. This relative and absolute increase was thought to be due partly to a more intensive search for the eggs and partly also to an increase during these months in the number of cases. Examination of the faeces of school-children showed that 33.8 per cent. harboured schistosomes and 19.2 per cent. had no parasites at all. There was an enormous infestation with intestinal parasites, but rare complaints of abdominal trouble. Zellweger's studies convinced him that the threshold of stimuli exciting complaints of such troubles is much higher among the natives than among the whites and also that the natives forget severe attacks of pain in a few days. Chronic and subchronic bilharzia can exist for long periods without pain. In the Belgian Congo van den Berghe found 50 per cent. of the school-children of the Yakusu Mission near Stanleyville infested with *S. intercalatum*.

Studying race influence Zellweger found that most of the carriers of the parasite belonged to the Pahouins or Fangs (e.g. 278 out of 427 carriers were Fangs) who are the largest tribe in the Ogowé area and are more often fishermen than other tribes are. Of the school-children examined 189 were Pahouins and 40.7 per cent. of these were carriers while 20.4 per cent. of children of other tribes were carriers. NERSSMAXX

and TRENSZ found that most of the patients having this parasite were Pahouins

The symptoms are described but the author remarks that it is very often difficult to be sure that any particular symptom belongs to this disease. Almost all the natives have intestinal parasites and malaria and often suffer from syphilis, gonorrhoea and *Loa loa*. Heavy infestations with *S. intercalatum* begin with high fever between 39° and 41°C marked malaise, pains in the upper abdomen, enlarged spleen and liver and more or less icterus. Bronchitic symptoms with a leucocytosis and slight eosinophilia, the cough disappearing after treatment with foudadin, are described in two cases. The liver and intestinal symptoms have a similar course and prognosis to those caused by *S. mansoni*. Allergic symptoms such as urticaria and bronchial asthma, are described but the author could not be sure that these were causally related to the bilharzia.

Subacute conditions may follow the acute stages when formed stools gradually appear containing layers of blood and mucus, there may then be severe abdominal pain and tenderness especially in the lower abdomen and along the colon. One 6-year-old girl had typical symptoms of appendicitis which disappeared after two injections of antimony. After some weeks or months the pain and blood and mucus may disappear but a self cure such as has been described in cases of infestations with *S. mansoni* and *S. haematobium* is hard to prove. Eggs are often found only after several stool examinations by concentration methods. foudadin can be given to provoke their extrusion.

In the chronic stage colitis with watery, not bloody, mucus was found in five women, all of whom were very emaciated. After prolonged search eggs were found, some of which were dead. Three were cured with 70 cc. of foudadin combined with rivanolein, one was improved but not cured, one died and autopsy revealed a rectal stricture which would not allow the passage of the little finger and eggs in the urine and stool, with peritonitis, colitis and adhesions between the large omentum and parietal peritoneum. There was also cystitis and slight bilateral hydronephrosis.

The bladder is however seldom affected though rectal polyps may occur. Dysmenorrhoea occurs fairly often but this may be due to the almost ubiquitous gonorrhoea and its complications but there remains a great preponderance of dysmenorrhoea without gynaecological troubles. Exacerbations of abdominal pain often occur during pregnancy beginning mostly in the second month with blood and mucus in the stool. In these cases there is a tendency to miscarriage in the second half of pregnancy.

For treatment foudadin, anthiomaline and a preparation called Versuchspreparat 1174/I + II and tartar emetic were used. These were equally good but foudadin and anthiomaline were rather less toxic than the other preparation. Tartar emetic was soon given up. The usual doses were given but two or three treatments were needed and the author is very doubtful whether a cure is effected. Parasites in the liver are not affected by therapy and relapses may be explained by this fact.

S. mansoni was found in two women and one child. The women had come to Gabon from Dahomey and the Cameroons respectively and the child had come from the French Congo.

S. haematobium was found in one man who had come from Togo

G. Lapage

CHOUDBURY (L. M.) & LARA (P. N.) A Hydatid Cyst of the Spleen.—*Indian Med Gaz.* 1942 Jan. Vol. 77 No. 1 pp. 29-30

LAZAREVIĆ (Vojin) Mächtige Nierenschmolkysten mit völligen Schwund des Nierenparenchyms [Large Hydatid of the Kidney]—*Deut Zisch f Chirurgie* 1942 July 20 Vol. 253 No. 11 & 12 pp. 747-750

CANNON (D. A.) A Case of Human Infection with a Species of *Coenurus*.—*Amer Trop Med & Parasit* 1942 June 30 Vol. 36 No. 1 & 2 pp. 32-34 With 5 figs on 2 plates.

An African male aged 30 complained of stiffness and discomfort in the right forearm when he used his rifle. A smooth elastic rounded rather tender swelling one inch in diameter was found. puncture failed to withdraw fluid. Under 2 per cent novocaine anaesthesia a colourless jelly like mass was excised, which proved, when sectioned, to be a coenurus cyst the species of which could not be determined. A slender fibroareolar capsule enclosed a very irregular space into which projected numerous scolices, each of which had four suckers, a rostellum and double row of sickle-shaped hooks, only one of which was completely preserved (its length was about 137 microns). References are given to six other cases of coenurus cysts found in man at least one of these occurred in the brain and caused Jacksonian epilepsy and other symptoms.

G. Lapage

WILSON (Paul W.) Maturation of Ascaris Ova in Sea Water—a Possible Factor in Dissemination of Ascariasis in American Samoa.—*Amer J Trop Med* 1942 May Vol. 22 No. 3 pp. 305-307

Stool surveys of 896 native Samoans belonging to widely scattered groups showed an incidence of 86.4 per cent of *Ascaris lumbricoides* 71.0 per cent of *Trichuris trichiura* 18.1 per cent of *Necator americanus* 0.5 per cent of *Strongyloides stercoralis* and 0.13 per cent of *Enterobius vermicularis*. Excepting about 400 people in inland villages all the 13,000 Samoans live in coastal villages. In several coastal villages where the latrine facilities had been considered adequate there was 100 per cent incidence of ascariasis.

Natives of the coast of American Samoa universally season their food with sea water instead of with salt. The food is usually "drunk" in fresh sea water just before it is eaten and always after it has been cooked. After a hard day's work or any exertion causing loss of salt by perspiration the natives also drink a mixture of equal parts of coconut milk and sea water taken freshly from the sea a few paces from the waterline in front of the village. There is also the further age-old custom of defaecating in the sea on the beaches which usually consist of flat coral shelves covered at high tide with only a foot or more of water which is relatively quiet so that removal of debris from it is sluggish. The eggs of both *Ascaris* and *Trichuris* are heavier than sea water which at Samoa has a specific gravity of 1.028 so that it might be more than 10 days before these eggs would find their way to deep water beyond the coral shelves. The roughness of the coral would itself hinder their removal. The author found experimentally that eggs of *Ascaris* would develop until the active larva was formed in 10 days in sea water aerated daily and containing 2 per cent. formalin at a room temperature of 80-85°F. Controls in fresh water took

the same time to develop to the same stage. Live eggs of *Ascaris* and *Trichuris* were found in shallow pools in the coral at low tide 60-75 feet from a beach latrine. Sea water taken from coral beach pools at low tide at a point about 20 feet to one side of the outlet of the discharge pipe from latrines contained 20 live eggs of *Ascaris* in various stages of development and one egg of *Trichuris* per gallon of sea water.

In four villages by the Willis brine floatation technique 100 per cent incidence of *Ascaris* was found in another which had no flat coral beach but deep water even at low tide the incidence was 65.3 per cent in another which lay about three miles inland on the Bay of Pago Pago the cookhouses had enough salt to season their food and sea water was not used because the villagers did not like the taste given by the sea water which they attributed to faecal contamination and the incidence here was 66.5 per cent.

The author thinks his results justify the assumption that *Ascaris* infestation from the sea water may account for some of the infestation and reinfestation of natives in Samoa.

G. Lapage

JUNGE (Werner). Die operative Behandlung der Elephantiasis des Beines. [The Operative Treatment of Elephantiasis of the Leg]—*Arch f Schiffs u Trop Hyg* 1940 Dec Vol 44 No 12. pp 549-562. With 6 figs.

In spite of all the improvements in internal therapy the treatment of elephantiasis is still purely surgical. Surveying existing operative technique the author agrees with VOGL's view that operation on the scrotum gives excellent results, but the results of operation on the extremities are rarely satisfying. Amputation has been rightly condemned. Plastic restoration of the limb has been sought by reduction of its circumference and by the provision of new lymph channels for the promotion of a better flow of lymph. The various methods of reducing the circumference of the limb are briefly described. Manson's method of making strips of skin 5-10 cm broad and 20 cm long and then removing the subcutaneous elephantiasis tissue is not satisfactory because such strips have too narrow a stalk and become necrotic being badly nourished. It is also wrong to open the marrow cavity of the bones in order to produce a new flow of lymph this procedure exposes the marrow to risks of infection from the elephantiasis tissue which is never sterile. The author has never found that the musculature is affected. KNOTT and RICE have shown that it is wrong to assume that the operation should be so radical that only healthy tissue remains. Another failing of existing methods is the insufficiency of the precautions taken. The principle of the operation must be the most thorough removal possible of all inflamed proliferative tissue and the creation of new lymph channels.

Junge has developed a new technique and has used it with slight changes for 6 years. Out of 26 cases which he was able to follow throughout most of this time only three relapsed and the relapse of one of these was so slight that another operation was not advisable. About 30 other cases passed out of his control and could not be followed up. The cosmetic and functional results were good throughout in almost all cases the result was a limb very similar to the healthy one.

Junge's technique varies according to the part of the leg affected and the form taken by the disease. There are at least three methods corresponding to the division of the limb into thigh, leg and foot and the disease can be divided into the cylindrical form, which may be oedematous or fibrous and the irregular form, which may be sulcate (furrowed) lobated or tuberosus.

The lower leg is most often affected and the commonest form here is the cylindrical form. Newly developed cases are mostly oedematous and older cases are fibrous and more pronounced. In oedematous cylindrical cases he found it wise not to resort to the knife too early or without due consideration. Conservative methods were best for these cases. Baths, massage, bandaging and elastic stockings gave as MAXSON showed, good results. When such methods fail operation may be considered, especially if the patient's capacity for work is seriously endangered. The main object of operation on oedematous cases is the creation of new lymph channels. Conservative therapy is, on the other hand, rarely needed for the fibrous cylindrical form. Operation is made necessary by the persistent relapsing lymphangitis and its attendant fever together with the weight and deformity of the limb and the reduction of the capacity for work. The object of the operation is not so much to repair lymph channels as to remove the elephantiasis tissue.

The author's method for operation on the lower leg, whether the disease takes the oedematous or the fibrous cylindrical form, is as follows:—

Before the operation all ulcers, pustules, open skin wounds, etc. must be healed up and the skin got into a healthy state. Baths, massage and vigorous rubbing of the skin with alcohol stimulate the blood supply to the skin. By night the limb is raised and by day bandaged. For operation the patient lies on his back with the leg as for amputation. The skin is painted with alcohol, iodine being avoided in order to preserve the skin, which is important for the success of the operation.

A slightly curved incision is made from the head of the tibia to the ankle joint. Two further incisions at the upper and lower ends of this make Y-shaped incisions at these points. The skin is now separated on both sides laterally as far as possible, extension of the initial incisions being made if necessary. One-third of the skin of the whole leg circumference must be left firmly adherent to the calf. Both flaps of skin are then drawn to the sides. The elephantiasis tissue thus exposed is now incised along the tibial margin as far as the periosteum and a similar incision is made, parallel to this and at a distance from it down to the muscle fasciae. These two incisions are joined by a transverse incision at their upper ends. The piece of tissue thus marked out is hooked up at its upper border, pulled away and separated from the underlying muscle fasciae. This separation is repeated in ring-like strips down the leg until none of the proliferated tissue remains except the part of it behind on the calf which is still connected with unseparated skin. During this part of the operation a great deal of dammed-up lymph flows away. The proliferated tissue left on the calf shrinks. The limb is thus reduced to its normal size and, if the subsequent operation designed to establish new lymph channels is well done, there is no subsequent oedematous seeping causing renewed swelling.

To restore the flow of lymph about 25 windows are cut in the muscle fasciae over the whole of the leg, each rather bigger than a postage stamp but none is cut over the tibia. Into each of these

windows a double silk thread is put by passing the needle deep through the muscles. The hanging ends of these are arranged like candle wicks to suck out lymph over the widest possible area of the leg.

The skin flaps are then replaced. If they are now too long they are shortened and this affords an opportunity to remove any diseased skin. It is better to shorten both flaps than to leave only one because this may necrose. Exact suture and insertion of an iodized gauze drain in the angle of the upper y-shaped incision completes the operation. Afterwards the limb should be splinted and kept raised and firmly bandaged to avoid secondary haemorrhage. After 48 hours the bandages are released only enough to enable the gauze drain to be removed. the first change of bandages is after 6-8 days.

Complications were rare. serious secondary haemorrhage practically never occurred but punctilious asepsis is very important. The two skin flaps having broader bases than those used by Manson are better nourished and only rarely necrose. They may have to be 15 cm in diameter and the beginner often shrinks from making them but only in a few of the author's cases did necrosis of strips of skin 1-2 cm broad along the tibial edge occur and this was harmless and quickly disappeared with treatment with zinc ointment. A scar forms over these areas and the defect can be made good with Thiersch grafts.

Operation on the irregular form of elephantiasis of the leg is not so simple. The sulcate form may present in the region of the foot joints a number of deep invaginations of the skin going down almost to the muscle fasciae or the leg may be encircled by ring like invaginations which do not go so deep. If the grooves are not deeper than about 0.5 cm they can be neglected, the operation being like that described for the cylindrical form. Deeper sulci are excised by incisions parallel to them and then the operation proceeds as before. If several sulci exist near together it is better to excise them all and skin grafts may then be necessary. The lobate form may hamper the technique even more and the curved incision described above may not be possible. LEMOINE was the first to use the wedge-shaped excision of stalked or lobated tumours of this kind at several sittings but Junge thinks it better if possible to excise them at one sitting in order to avoid the risks of lymphangitis. The incisions must depend on the position and size of the lobes and swellings and the only directions that can be given are that the principles must be to reduce the size of the limb and to promote new lymph channels to aim at altering the complicated form into a simple one to choose incisions that give skin flaps with broad bases and to avoid the use of the skin on the lobes for mending defects because it may be diseased.

Operation on the tuberous form is almost impossible. In this form the pathological process is mostly in the skin itself which is very much thickened to form tuberosities rolls and nodules. It is practically impossible to save skin to repair defects at the end of the operation. In such cases the author tried Connor's method with quite good results. This method removes all the thickened tissue and covers the defective area with Thiersch grafts.

The method used for the leg cannot be used for the foot because the anatomy is so different. In the foot the cylindrical and irregular forms occur although as the foot is usually uniformly affected and as its shape is different the term cylindrical may be replaced by the term uniform. The operation described above for the oedematous form does not give good results in the foot because the silk threads inserted

to promote the flow of lymph work well only near the foot joints they do not work well in the tendinous parts and all Junge's attempts to drain the dorsum of the foot failed. These cases were always treated by conservative methods. Once the swelling can be reduced sufficiently to permit the wearing of boots, much is accomplished and boots should be worn to prevent the return of the swelling. It is much more difficult to decide whether to operate on the longer-standing fibrous form, and the author thinks that operation should only be done on patients with this form whose capacity for work is very seriously limited or is abolished. Renewal of the lymph flow is not possible, and in all his cases the removal of the affected tissue without lymph drainage resulted in relapses so that this method must be rejected. Removal of the skin and subcutaneous tissue with grafts to cover the skin deficiency give more permanent results.

For this operation special care of the skin is not necessary nor is it necessary to reduce the volume of the foot by rest in bed and raising of the limb. The whole foot may be painted with iodine. At the upper border of the proliferated tissue at about the level of the malleoli a circular incision is made round the ankle joint down to the fasciae. From this an incision is made in the middle line of the dorsum of the foot to the toes and a corresponding one from the Tendo Achillis to the lower border of the heel. All the diseased tissue and skin is separated from the fasciae on both sides of the incision up to the border of the foot. A horizontal incision along the lateral border of the foot separates all this, so that the flap hangs only from the toes. If the toes are involved the tissue of their upper sides is removed by traction on the flaps. Otherwise a transverse incision along the base of the toes separates the flaps. The foot is then covered with healthy skin from the thigh. Especially good covering of the ankle is necessary to prevent cicatrization here. Few difficulties occur with native patients who have such good powers of regeneration but the author does not know whether this would apply to Europeans.

The irregular form is more frequent in the foot being almost the rule. Sulcate lobated and tuberos forms may occur together and the radical operation is then necessary. The tuberos form showed most relapses which often took the form of small nodular excrescences like dermatitis verrucosa. Conservative treatment was adopted for lobate forms that affected only parts of the foot.

In the thigh the disease is least common. It never appears without similar disease of the leg or foot. It is seldom so extensive that it needs a special operation. The oedematous cylindrical form is the commonest. Usually lymph from the leg has been blocked in the thigh and after operation on the leg the disease may disappear from the thigh with palliative treatment. The fibrous form may need operation. A curved incision is made along the outer side over the fascia lata and the flap of skin left connected with the subcutaneous tissue and muscle fascia correspond with the course of the saphenous vein. This avoids so far as possible damage to the superficial vessels. It can be assumed that the lymph flow on the inner side of the thigh still functions so that attention to the lymph flow can be concentrated on the outer side the fascial windows being made especially big. The author never saw the irregular form with skin invaginations in the thigh but other authors have written of the lobate form. KNOTT limits himself to simple extirpation and covering the deficiency with the healthy skin. The cylindrical form then remaining can be dealt with by the

operation described above. The tuberous form can only be dealt with by Connor's method but as the wounds are then so large that they cannot be covered by grafts this form is inoperable.

Combined disease of the thigh, leg and foot is best treated by operation first on the leg and then on the foot. Palliative methods may be sufficient to reduce the foot. The thigh is always done last.

G Lapage

HILLMAN (Robert W) **Oxyuriasis of the Appendix** a Clinical Study of 31 Cases.—*Brooklyn Hosp Jl* 1941 Apr Vol 3 No 2 pp 83-93 [22 refs]

The author discusses 31 cases in which *Enterobius vermicularis* was found in the appendix by either gross or microscopical examination. These represented 2.39 per cent. of all cases operated upon for appendicitis during four years.

The infestation was found in both sexes and at all ages but was commonest in girls of school age or at adolescence. All the patients except one negro were whites with an average age (excluding the two aged 63) of 13.1 years, the youngest being 5 years old and only six being older than 20 years. Only eight were regarded as being acutely ill but 19 were regarded as emergencies. The cases were commoner in September and October and 22 cases occurred during the last six months of the year.

The usual history is of recurrent attacks of appendicitis during 1-2 years with mild abdominal pain, nausea and often vomiting for several days before admission. The temperature is normal, the patient is not acutely ill, being in general not so ill as patients suffering from appendicitis due to other causes, but there is moderate abdominal tenderness and a slightly increased total white cell count with a relative increase of polymorphonuclears. The clinical picture varies however so much that the disease cannot be differentiated from acute suppurative appendicitis. There are usually no inflammatory changes and there is no characteristic pathological picture. Possibly the symptoms are due to hyperperistalsis of an appendix which is trying to expel the worms.

When a girl of school age has intermittent abdominal pains for 1-2 years and the clinical picture of mild to moderate appendicitis, *Enterobius* should be suspected as the cause. Generalized infestation of the lower intestine may be responsible for some of the symptoms, the more severe attacks of abdominal pain and vomiting being due to infestation of the appendix. The literature recording the incidence of *Enterobius* in the intestine and in the appendix is discussed.

G Lapage

DEFICIENCY DISEASES

CHEN (Ji) **Nutritional Edema in Children**.—*Amer Jl Dis Children* 1942 Mar Vol 63 No 3 pp 552-580 [Refs in footnotes]

After a preliminary review of nutritional oedema the author gives data derived from a study of child refugees from the Sino-Japanese war zone. Most of the children had associated disease and had been living on diets deficient in protein, particularly animal protein, fat

calcium phosphates iron and vitamins especially the B complex C, A, and D. Of 903 children 433 (48 per cent.) showed clinical manifestations of nutritional disease and 130 (14 per cent.) had oedema apparently directly due to nutritional deficiency. Nutritional oedema was less frequent in infants than in older children, perhaps owing to the fact that many of the infants were fed on mothers' milk. There was little difference between the sexes except below 2 years of age when females suffered from oedema more than males probably owing to the greater care given in China to male infants. In the oedematous children there was a higher incidence of beriberi, tuberculosis, noma and lobar pneumonia than in the non-oedematous children who suffered more from typhoid, bronchopneumonia and rickets. The presence of oedema did not alter the general mortality rate but appeared to parallel a higher mortality in the infants under 2 years of age. The main causes of death in those with nutritional oedema were bronchopneumonia (31 per cent.) bacillary dysentery (27 per cent.) and noma (20 per cent.)

Of special interest was the presence of oedema of the brain, which was found in 50 per cent. of the autopsies and was thought to be due to more than the general tissue oedema. Adrenal changes, especially cortical atrophy were also common and may have played some part in the production of the tissue oedema. The main factor in the production of oedema seemed, however to be the low osmotic pressure in the blood due to lowering of the serum albumin and lack of compensation by the other proteins of the blood, but other factors are involved, as there were many patients with very low serum albumin values and without globulin compensation, who did not have oedema. Nevertheless determination of serum albumin is the most important test in the study of nutritional oedema, all the oedematous patients showing values below the lower level of normal (4.5 per cent.) while 77 per cent. were below the critical level of 3 per cent. The serum globulin values of most of the oedematous patients, and of all the non-oedematous patients were either normal or higher than normal, and the values were proportionately higher in the non-oedematous group.

F. Margatroyd

Rao (M V Radhakrishna) Intestinal Changes in Monkeys fed on Poor Rice Diets.—*Indian J Med Res.* 1942, Apr Vol. 30 No. 2. pp 273-284 With 20 figs. on 5 plates [12 refs.]

The object of this investigation was to observe the effect on monkeys of long-continued feeding on poor rice diets resembling those consumed by man in India. The production of any specific type of deficiency disease was not aimed at, but the most important observation was the tendency of the deficiently-fed monkeys to develop diarrhoea associated with specific change in the small intestine.

Young monkeys (*Macacus sinicus*) 4-7 pounds in weight were divided into two groups. Those of one were fed on a well-balanced auto-vegetarian diet resembling that consumed by certain races in North India. The other on a "poor S Indian diet" resembling that consumed by poor rice-eaters and given in a cooked state.

The first diet was superior in nearly all important food factors—the second deficient in vitamins A, B and C and in calcium. Altogether 84 animals were observed—23 on the first, 61 on the second diet.

No significant differences in nutrition were noted during the first few weeks but later on the health and well being of the latter deteriorated. These animals soon became listless lost energy and interest some died within 6-8 weeks others survived 8-12 months.

The appetite was impaired and there were attacks of diarrhoea with 4-10 small pale stools a day. In animals thus affected a supplement of milk sprouted grain and one banana a day usually checked the diarrhoea.

It was further noted that if the animals as many did contracted dysentery (with blood and mucus) those of the first group recovered quickly but in the second it passed into subacute or chronic stage.

Some animals of the group showed signs of deficiency—catarrhal ophthalmia xerosis of the conjunctiva oedema of the eyelids pyorrhoea, bleeding sometimes ulceration of the gums, spastic or flaccid paralyses and chronic ulcers.

The hair became coarse sparse and staring—some showed symmetrical denudation over hands and feet with rough and scaly skin hyperpigmentation and branny desquamation suggestive of pellagra. The tail also showed similar changes.

A few showed oedema of the lower part of the face or scrotum, some of the hands and feet. The addition of dietary supplements cleared this up. The terminal clinical picture was one of great emaciation prostration and chronic diarrhoea.

None of these changes was noted in the first group.

Pathological studies pointed to the essential atrophic changes in the small intestine and were similar to the withering of the villi described by FAIRLEY and MACKIE in sprue. In those animals with prolonged diarrhoea there was flattening of the villi with decrease of reticular tissue. Degenerative changes were constantly present in Auerbach's plexus in most cases it was enlarged, oedematous and easily recognized. In the nervous system slight degeneration was evident in the posterior columns and nerve roots occasionally there were similar changes in the lateral columns.

Haematological studies revealed mostly hypochromic anaemia in a few it was markedly microcytic. In not a single case was macrocytosis observed. Lesions of the large intestine were evidently the result of superimposed bacillary dysentery and in one instance *Bact dysenteriae* (Flexner) was isolated.

The intestinal changes could not be ascribed to deficiency of any particular vitamin but were closely similar to those described by MCKENZIE in nutritional diarrhoea in E. African natives [this *Bulletin* 1940 Vol 37 p 809].
P. Manson Bahr

BATRA (Brij Lal) Pellagra in Bilaspur State—*Indian Med Gaz* 1942 May Vol 77 No 5 pp 269-271

Twenty cases of pellagra are reported in Bilaspur State which is situated in the Simla Hills. Four of them were considered to be typical while the remaining cases were less severe and were classed as atypical. Of the whole group of patients fourteen were male and all were Hindus of the poorer classes living on a staple diet of maize and dal. Clinical improvement followed the administration of a well balanced diet with nicotinic acid and marmite.
L. J. Davis

JEGHERS (Harold) Nutrition: the Appearance of the Tongue as an Index of Nutritional Deficiency.—*New England Jl of Med* 1942. Aug 6 Vol 227 No 6 pp 221-228. [37 refs.]

It is not possible to summarize this article which itself is of the nature of a summary. It is the purpose of this review to point out that the modern physician can use this simple observation (the appearances of the tongue) to a much better advantage than his predecessor.

The author has succeeded in his aim and presents an interesting account of the tongue in general diseases and in diseases of malnutrition. reference is made to the dry tongue, the coated tongue, the glossitis of nicotinic acid and riboflavin deficiency. Hunter's glossitis, Moeller's glossitis atrophic glossitis, black hairy tongue and wandering rash of the tongue. For all those unfamiliar with these various conditions Jegher gives an excellent summary with a useful list of references.

H. S. STANNUS

MOORE (Robert A.) SPIES (Tom D.) & COOPER (Zola K.) Histopathology of the Skin in Pellagra.—*Arch Dermat & Syph* 1942. July Vol 46 No 1 pp 100-111 With 5 figs [18 refs.]

Although a number of histological studies of the skin lesions in pellagra have previously been recorded, little or nothing is known about the histology of clinically unaffected skin in this condition.

This paper discusses the results of histological studies of biopsy specimens from clinically affected and unaffected areas of skin from 13 patients with clinical pellagra. The skin from both areas was hyperkeratotic while parakeratosis and acanthosis were found only in the actual lesions. Atrophy of the epidermis, oedema and a moderate infiltration of lymphocytes were also found both in the affected and unaffected skin. The authors conclude since the skin reacts favourably to nicotinic acid treatment that these changes are to a considerable extent reversible and that they may represent a specific response on the part of the skin to a deficiency of part of the vitamin B complex.

L. J. DAVIS

LEONIDA (Joad) Ist Pellagra erblich? [Is Pellagra Hereditary?].—*Arch f Schiff's u Trop Hyg* 1940 July Vol 44 No 7 pp 316-319

This article is noticed here for two reasons. First because it has been thought worthy of acceptance by a reputable journal, second, because any new theory as to the aetiology of a disease whose causation is still obscure should be given at least a hearing.

The author quotes four cases, or rather family groups of cases which have come under his observation—

1. A child, 8½ years old, typically pellagrous since 1936 the father became pellagrous three years later at age 39. Therefore the pellagra factor was present in the germ cells of the father at a time when the pellagra was not yet manifest. A paternal uncle of the child became pellagrous in 1937 and died of the disease. Here says the author the heredity is obvious. (A strange interpretation of the facts of heredity—the order of appearance of the pellagra was first in a child born in 1931 and developing the disease at the age of 5 years, next in an uncle becoming pellagrous the following year at age 30 odd, and lastly in the father two years later still.)

2. A woman of 44 years her mother a sister a first cousin (a woman also of 44 years) her mother and two daughters (of five children) were all pellagrous. The author's comment on this series is Heredity showed itself in the females only and this rules out any avitaminosis — an obvious *non sequitur*

3. A woman of 35 years with latent syphilis. Pellagra symptoms appeared in 1938 and were cured with ovarian preparations. Relapses in each of the following three years were treated with folliculin. The next year one of her children aged 4 years a congenital syphilitic showed symptoms of pellagra. Inherited syphilis says the author is of the utmost significance in leading to photosensitivity of the skin. The pellagrous erythema in this case [presumably the mother] can be controlled by male or female sex hormone without the giving of vitamins improving the nutrition or protecting from sun light. [Is the rash pellagrous at all? May it not be syphilitic?]

4. A woman of 43 with typical pellagra and acute mania with hallucinations and delirium. She was given three injections of 10 000 units folliculin 12 injections of bismuth and 6 gm of neosalvarsan. At the conclusion of treatment the pellagra was completely cured and she has remained three years without relapse. Every year however she has a course of bismuth or solusalvarsan injections. [It is difficult to see where the heredity comes in here. The symptoms would be explained by climacteric in a syphilitic.]

The author concludes that pellagra is due to an hereditary constitutional factor and that nutrition and avitaminosis play no part that what is hereditary is the photosensitivity of the skin and that the intestinal symptoms are purely secondary. As burns of the skin may be found associated with duodenal ulcer at autopsy so may pellagra dermatitis which bears an analogy with burns of the first and second degrees be associated with gastro-intestinal disturbances. Finally

it is not logical to treat a gastritis or a fermentative process in order to cure a patient with photosensitivity inherited or acquired much more hopeful is it to treat the photosensitivity with hormones and antisyphilitics. [A most unconvincing paper.] H. Harold Scott

ZSCHUCKE (Johannes) Beitrag zur Kenntnis des Vitaminstoffwechsels beim westafrikanischen Farbigen [The Vitamin Metabolism of West African Negroes]—*Arch f Schiffs u Trop Hyg* 1940 June Vol. 44 No 6 pp 281-289

The author studied the vitamin C nutrition of nine healthy natives and 35 native hospital patients. Vitamin C was estimated in the urine before and after a test dose of ascorbic acid. It was assumed that saturation exists when 100 cc of fresh urine reduces more than 5 mgm of dichlorophenolindophenol. The healthy persons showed a remarkably high vitamin C excretion and even the hospital patients compared favourably with healthy Germans. Only patients suffering from trypanosomiasis had a very reduced urinary output of ascorbic acid and needed extremely large amounts of vitamin C to maintain an adequate excretion level. The paper contains two tables, one giving the results of vitamin C estimations on a number of tropical plants and the other the results of provitamin A determinations on some tropical and imported food products. The chemical methods employed were

such that the results can be considered only as approximate. The author was unable to find clinical evidence of any type of avitaminosis in Spanish Guinea.
H N Green

SPRUE

PACHECO MARRQUIN (Salvador) Contribución al estudio y tratamiento del sprue [Sprue and its Treatment.]—*Rev Med Iberoamericana* 1942 July 1 Vol 22. No 7 pp 3725-3744 [Bibliography]

This article is very unequal. Some of it partakes of the nature of a clinical lecture and views are stated without any attempt to discuss their relative values such as, for example that sprue is thought by some authorities to be an infective disease by others attributed to dysentery fistula abscess or enteric fever or again that it may be a complication of haemorrhoids, syphilis or tuberculosis. Another peculiarity is the author's classification of blood cells normoblasts megaloblasts and monoblasts [whatever these may be—the term is not defined] are all classified as leucocytes.

The main interest, however lies in yet another theory of causation and a mode of treatment based thereon. The author's view is that tropical and non-tropical sprue are one and the same and are due to disturbance of the bone-marrow which in turn destroys endocrine synergy. As a consequence the deficiency or absence of hormones leads to mal-assimilation of certain vitamins and so to avitaminosis and non-assimilation of fats. Parathyroid dysfunction causes loss of fixation of calcium in the blood with resultant reduction of alkalinity and change in the pH. Acidity favours the development of monilia, etc. while the endocrine disturbances interfere with or alter the functioning of the sympathetic which regulates digestion and results in functional and trophic disorders. On correcting the disturbance of the bone marrow the endocrine synergy recovers and the symptoms of sprue disappear hence the treatment of sprue is to be based on injections of extract of bone marrow strengthened by liver extract hormones (pancreas parathyroid, etc.) and vitamins. [This seems quite simple and the only thing lacking is a fact or two to support the theory.]

The author gives detailed results of the treatment of 53 cases of sprue these are classified as follows —

- 1 Six treated exclusively with vitamins B₁ B₂ complex, C and A according to the indications. Improved but relapsed.
- 2 Five treated exclusively with antithyroid extract [? parathyroid] Improved, but serious relapses.
- 3 Seven treated with hormones parathyroid extract suprarenal cortex and pancreas. Improved but relapsed.
- 4 Six treated exclusively with liver. Much improved but relapsed after long intervals.
- 5 Six treated solely with bone marrow. The author's method is to take the marrow from the sternum of a healthy person and inject it into the medulla of the sternum of the patient [no dosage stated, nor intervals between injections]. All six cured, but without complete restoration of the total red cell count.

6 Fifteen treated with the marrow and with liver Cured without relapse and with complete restoration of the blood

7 Five treated with marrow liver parathyroid and suprarenal Results as in the last but attained more quickly

8 Five who died in spite of all the above methods of treatment

According to the above groups 5 6 and 7 were the only ones cured 26 patients in all but in a table of final results the author shows that three died three improved but had serious relapses and 47 were completely cured with no relapses up to the present [No attempt is made or explanation offered to reconcile these discrepancies]

H Harold Scott

HAEMATOLOGY

JONES (E Baker) Sub-Clinical Anaemia of School-Children in Southern Rhodesia.—*Trans Roy Soc Trop Med & Hyg* 1942, Aug 31 Vol 36 No 2 pp 99-116 With 2 diagrams [11 refs.]

A preliminary survey having suggested that sub-clinical anaemia was the rule rather than the exception among school-children in Southern Rhodesia careful determinations of the haemoglobin levels in 2 173 European and 304 coloured school-children were made by Newcomer's method. In the absence of a normal standard for healthy persons living under ideal conditions in Southern Rhodesia the average figure for the European children was taken as the normal standard and was found to be 13.49 grammes of haemoglobin per 100 cc. blood (equivalent to 87.7 per cent on the Haldane scale). The lower level for normality was arbitrarily placed at 90 per cent of this figure to the nearest 0.5 gramme of haemoglobin, namely at 12 grammes haemoglobin per 100 cc. blood (87 per cent Haldane) any figure below this being taken as representing anaemia.

Of the European children 320 (14.7 per cent) were found to be anaemic and of the coloured children whose average level was only 12.99 gm. haemoglobin per 100 cc. blood, 70 (23 per cent) had values below 12 gm. and were therefore considered to be anaemic.

It has been said that the salient anaemia producing influences in Southern Rhodesia were disease [presumably parasitization] climate diet and altitude. Of the European children 11.5 per cent harboured parasites the average haemoglobin values for these children being 13.2 gm per 100 cc. blood and 23.2 per cent. of the children had values below 12 gm. Similarly 13.5 per cent. of the coloured children were parasitized their average haemoglobin value being 12.08 gm per 100 cc. blood and 36.6 per cent. of them were anaemic. Analysis of determinations made during the warm season lent no support to the theory that anaemia may be dependent on climatic factors and no evidence was obtained that the altitude of the plateau region of the Colony had any effect in raising the haemoglobin index. A comparison was made between the boarders in school hostels and the non boarders with a view to examining the effects of diet on the haemoglobin levels but owing to the conditions of the observations no clear results were obtained although boarders receiving a relatively high protein and

iron intake showed less anaemia than those receiving a low intake. Incidentally parasitic infections among the European boarders did not appear to have any marked effect on the haemoglobin concentration of the blood. There was, as is commonly found in children, a gradual increase in the haemoglobin levels with increasing age, possibly due to increasing immunity to various infections and to an increasing proportion of protective foods in the diet. *F. Murgatroid*

VENOMS AND ANTIVENENES

CHOPRA (R. N.) CHOWHAN (J. S.) & CHOPRA (I. C.) Sterilization of Snake Venom Preparations.—*Indian Med Gaz* 1942 Jan Vol 77 No 1 pp 23-28 [10 refs.]

Snake venom preparations are often contaminated, and it is important in view of the therapeutic use of these venoms now being made that a method of sterilization should be found. It is known that heat destroys certain properties of venom, for instance cobra venom heated to 75°C loses its haemorrhagic principle. Filtration through Seitz discs also removes certain principles.

The authors have investigated this subject using the venoms of the cobra and *I. russellii*. Tyndallization (heating to 60°C. for one hour daily on three successive days) is unsatisfactory for Russell viper venom, organisms being found after the process; this venom is often contaminated even in the dry state. Filtration is satisfactory from the point of view of sterilization but affects the toxicity and therapeutic efficiency. Sterilization by the addition of sodium merthiolate (0.01 per cent final concentration), phenol (0.25-0.5 per cent) or tricresol (0.25-0.5 per cent) is effective and maintains intact all the active principles.

Care should, however, be taken in the collection of venom. The authors point out that the buccal cavities of snakes kept in well-drained open parks are usually relatively sterile but that in captivity or after frequent extraction of venom, the bacterial flora is much increased. Aerobic and anaerobic organisms may be found. *C. H.*

BOQUET (Paul) & DELAUNAY (Albert) Réactions du mé-entère du cobaye au venin et à l'anavenin de *L. spera aspis*. [Reactions of the Guinea-pig Mesentery to the Venom and the Anavenene of *L. aspis*].—*C. R. Soc. Biol.* 1942 Apr Vol 136 No 7-8. pp 320-321

Venom injected into the peritoneal cavity of guinea-pigs produces in the mesentery numerous and characteristic ruptures of the blood vessels. The capillaries are dilated and the endothelial cells swollen and globular. Leucocytes enter the mesenteric tissue; first polymorphonuclears and later mononuclears predominate. Control animals which receive saline injections show no such changes. Anavenene prepared from the same venom by mixture with formaldehyde, does not give this reaction, nor does a mixture of venom and its anti-serum, though in the latter case there is considerable leucocyte reaction such as occurs after injection of immune or normal serum.

When venom loses its toxicity under the influence of formaldehyde therefore it loses at the same time its local haemorrhagic power and this action like the other toxic and diastatic properties is inhibited by antivenene. C IV

BROOKS (Georges) Sur l'étude chimique et spectrographique de la fluorescence des venins de serpents. [Chemical and Spectrographic Study of Fluorescence of Snake Venoms.]—*Ann Inst Pasteur* 1940 June Vol 64 No 6 pp 558-564 With 1 fig & 2 charts

Both viper and cobra venoms fluoresce when examined in ultra-violet light with a microfluoroscope the fluorescence is bluish but with viper venom there is a golden yellow tint. The fluorescent substance has certain properties which relate it to the synthetic flavines (riboflavine) and while in viper venom this exists in the free state, in cobra venom it is combined with protein. Fluorescence has not previously been described in snake venom but it is possible that the substances responsible for it may have some physiological action.

The work was done on venoms of *Vipera aspis* and *Naja tripudians* C IV

VELLARD (J) Modifications sanguines provoquées par les venins (quatrième mémoire) Action hémolytique et variations de la résistance globulaire *in vivo* [Haemolytic Action of Snake Venoms, and Variations of Erythrocyte Resistance *in vivo*].—*Ann Inst Pasteur* 1940 Sept. Vol. 65 No 3 pp 170-197 With 6 graphs

[For previous papers in this series see this *Bulletin* 1934 Vol. 31, p 101 1935 Vol 32 pp 376 380 1936 Vol. 33 p 390]

The haemolytic action of venoms has been extensively studied *in vitro* but the *in vivo* action is little understood. The phosphatidase activity of venom is exercised on red cells and on the plasma and plays a large part in haemolysis but the venoms of the VIPERIDAE and some of the COLUBRIDAE possess coagulant and protease principles which tend to prevent haemolysis and to increase red cell resistance. In the present research the authors have found that the venom of *Naja tripudians* (which possesses high phosphatidase properties but is non-coagulant) provokes in the blood of injected dogs the appearance of powerful haemolytic activity which leads to massive destruction of red cells and release of haemoglobin. In this positive phase there is diminished resistance of the cells to hypotonic solutions but this phase is always short. In the later (negative) phase the breaking down of phosphatide is increased but the haemolytic power disappears and cell resistance to hypotonic saline returns to normal. Natural haemolysins for foreign red cells (sheep horse) are diminished in the positive phase but soon return to normal.

The diminution of resistance to hypotonic solutions during the positive phase is due to haemolysins formed in the circulation. The venom exercises an action on the cells which are increased in size and which lose resistance to the haemolysin of venom but in the negative phase this resistance is increased. Autohaemolysins rarely persist for more than one hour after injection regeneration of phosphatides is slow and it is usually 24 hours before the serum recovers its haemolytic power in the presence of a venom *in vitro*.

Venoms which are phosphatidasic and coagulant (*Crotalus terrificus*) have much the same effect but the coagulant action strengthens cell resistance to venom haemolysins.

With some Crotalines the *in vitro* haemolytic action may be completely masked, and cell resistance to hypertonic solutions may be markedly raised from the first but haemolytic property reappears if these venoms are heated at 72°C to destroy protease.

The rapid breaking down of blood phosphatides, which causes rapid disappearance of the haemolytic property of plasma and the rapid increase in cell resistance to the venom haemolysins, prevent cell destruction and play an important part in the defence of the organism. C II

RANOV (G) BOQUET (P) RICHOU (R) & NICOL (L) Les anavenins spécifiques et les substances adjuvantes et stimulantes de l'immunité dans la production des sérums antivenimeux respectivement dirigés contre les venins de *Cerastes cornutus* et de *Naja-haje*. Anavenenes and Adjuvants Stimulating Immunity against the Venoms of *C. cornutus* and *N. haje*—*Ann Inst Pasteur* 1941 Nov Vol 67 No 5 pp 355-358

The authors refer to the reduction in time effected, in the production of high titre antitoxins by the use of anatoxins of diphtheria and tetanus which are mixed, before injection, with tapioca. This substance acts apparently as a stimulant in the production of immune bodies. They now record the application of their method in connexion with the preparation of antivenenes against the poisons of *C. cornutus* and *N. haje*. The respective anavenenes prepared by the well-known method were divided before each injection into two parts to one of which was added tapioca, to the other tannin but in proportions not detailed. The injections were made every few days in horses and the titres of the sera estimated at intervals. In this way potent antivenenes were obtained in 4-5 weeks, whereas by using the old method of injecting crude venom, immunization for 8-10 months was necessary. C II

TROPICAL OPHTHALMOLOGY

A REVIEW OF RECENT ARTICLES—VL*

Eyelids—PATHAN¹ has described an operation for trichiasis which he has found satisfactory in Karachi. It consists in the grafting of a skin flap taken from the surface of the lid into an incision made in the inter-marginal space. The centre of the elliptical skin flap is left attached and its two extremities are drawn through a tunnel made in the lid border between the wound in the surface of the lid and that in the inter-marginal space. The ends of the flap are then spread out in the inter-marginal wound and stitched in place. The author

For the 30th of this Series see Vol 30, pp 401-404

¹ PATHAN (H. A. H.) Trans grafting Operation for Trichiasis and Entropion of the Upper Lid—*Indian Med Gaz* 1942 Apr Vol 77 No 4 pp 204-208 With 7 figs.

states that he has found van Milligan's operation and its modifications practised successfully by many ophthalmic surgeons somewhat unsatisfactory

Conjunctiva—THYGESON & STONE³ have studied 50 cases of *inclusion conjunctivitis* occurring in infants, children and adults and conclude that the infection is mostly derived from a low-grade urethritis in the male and a sub-clinical cervicitis in the female, limited in the latter case to the region of transitional epithelium just within the external os *uteri*. Gonorrhoea and the virus disease are often associated but appear to be entirely independent infections. Infection of infants commonly occurs during delivery and adult infection by way of swimming pools and direct contamination. The disease is stated usually to be rapidly cured by sulphanilamide or a derivative.

Trachoma—WILSON⁴ in a review of the pathology of *trachoma* remarks that in Egypt one seldom sees a case of uncomplicated trachoma from the earliest time of infection, since practically all patients have suffered from a previous Koch Weeks or gonococcal conjunctivitis or commence with an acute mixed infection. In observed cases of accidental infection the disease has always commenced a few days after infection with moderately acute symptoms but the onset is generally insidious. His summary is that the pathology of trachoma is that of a chronic inflammatory disease which is entirely independent of any so-called constitutional lymphatic dyscrasia. The type of pathological reaction suggests a virus infection and thus is probably represented by the elementary granules of the Prowazek Halberstaedter body. Papillary hypertrophy, follicle formation on the tarsal conjunctiva and corneal lesions invariably occur and the disease terminates in scar formation.

Struck by the contradictory reports regarding the value of sulphonamide therapy in trachoma, JULIANELLE & SMITH⁵ have conducted experiments on the monkey (*Macaca rhesus*) to test the value of the drug when used *in vitro* on infective trachomatous material. They state that it was not possible to demonstrate that sulphanilamide has any appreciable effect on the infective capacity of the virus of trachoma. Analysing the result of sulphanilamide therapy during a three years trial in the treatment of 338 white trachomatous patients in Kentucky, SORY⁶ has concluded that the drug only exceptionally arrests trachoma and is by itself less reliable than other accepted forms of treatment but that it certainly accelerates recovery when employed in combination with other therapeutic measures, even then recurrence may take place thus proving that the disease has been arrested but not cured.

Observers in Tunis have reported remarkably good results in the treatment of the disease by the oral administration of a preparation

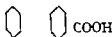
³ THYGESON (Phillips) & STONE (William) Jr. Epidemiology of Inclusion Conjunctivitis.—*Arch Ophthalmology* 1942. Jan. Vol. 27. No. 1. pp. 91-119. With 5 figs. [35 refs.]

⁴ WILSON (Rowland P.) The Pathology of Trachoma.—*Acta Ophthalmologica Orientalia*. Jerusalem 1940. Jan. Vol. 2. No. 1. pp. 1-14. With 28 figs. [10 refs.]

⁵ JULIANELLE (L. A.) & SMITH (J. E.) Studies on the Infectivity of Trachoma. XI. The Effect of Sulfanilamide on the Virus.—*Amer Jl Ophthalm* 1942. Mar. Vol. 25. No. 3. pp. 317-321.

⁶ SORY (Robert) Sulfanilamide in the Treatment of Trachoma. Results after Three Years of Trial.—*Amer Jl Ophthalm* 1942. June. Vol. 25. No. 6. pp. 713-720. [19 refs.]

called azouque 33 (or G.33). This is a potassium and sodium salt of parasulphamido-phenyl azo salicylic acid whose chemical formula is stated to be



and forms a tasteless insoluble yellow powder. BARRAT⁶ has used it in doses of 1.5 gm given every morning and evening for a week. The drug is omitted during the following week and treatment is then resumed. This observer and BERCE⁷ claim that corneal complications are nearly always rapidly relieved, that secondary infections are controlled and that follicle absorption is effected. Chronic cases require treatment for two and a half to three months in order to effect a cure. No injurious blood changes occur even when large doses are given, but a slight leucopenia followed by a moderate lymphocytosis was seen in a few patients. The same two observers⁸ have used a soluble lithium salt of the drug to test its toxic action when administered to the rabbit intravenously and have found that very large doses produced no harmful effect. They suggest that intramuscular injection of the drug might prove useful in the human subject.

ESTIBOTTE and ROUSSEL⁹ found, in the treatment of 16 school-children that corneal complications yielded to the drug, but that lesions of the tarsal conjunctiva were more resistant. Five of the children failed to respond to the treatment. SÉDAN and others¹⁰ also report favourably but say that the preparation had no specific action against secondary conjunctival infections particularly Koch Weeks inflammation and that these required suitable local treatment. They noted the occurrence of a definite polynuclear leucocytosis in those cases which responded well to treatment by the drug. BURNET, CURNOD and NATAF¹¹ claim that the drug is practically innocuous and that by its use a clinical cure can be effected in a certain number of cases, and also note the occurrence of a polynuclear leucocytosis in those patients who readily respond to treatment. They have been able to observe the late result in 23 patients and report that in 18 of these a clinical cure had been obtained. It may be noted that most of these required from five to ten months of treatment. GRADLE¹² has

BARRAT (P). Essai de traitement collectif du trachome par un composé azouque sulfamidé (G.33).—*Arch Inst Pasteur de Tunis* 1941 Dec Vol 30 No 3-4 pp 337-244

⁷ BARRAT (P) & BERCE (Ch). Recherches sur le traitement du trachome par l'azouque sulfamidé 33. Étude du sang des sujets traités.—*Arch Inst Pasteur de Tunis* 1940 Dec Vol 29 No 4 pp 408-436

⁸ BERCE (Ch) & BARRAT (P). Quel est le degré de toxicité chronique de l'azouque 33 administré par voie intra-veineuse chez le lapin.—*Arch Inst Pasteur de Tunis* 1940 Dec Vol 29 N 4 pp 437-449

⁹ ESTIBOTTE (R) & ROUSSEL (H). Essai de traitement du trachome avec le composé 33 sur 15 écoliers de la banlieue N de Tunis.—*Arch Inst Pasteur de Tunis* 1940 Dec Vol 29 No 4 pp 450-454

¹⁰ SÉDAN (Jern), KOUTSEFF (A), LÉVON (J) & GAUDIN (M). Traitement du trachome par le G.33. Étude hématologique.—*Arch Inst Pasteur de Tunis* 1940 Dec Vol 29 No 4 pp 398-403 With 2 figs

¹¹ BURNET (Et), CURNOD (A) & NATAF (R). Traitement chronique du trachome par l'azouque sulfamidé 33. Résultats éloignés. Coénzymes.—*Arch Inst Pasteur de Tunis* 1940 Dec Vol 29 No 4 pp 389-397

¹² GRADLE (HARRY S). Visual Results in the Trachoma Clinics of Southern Illinois.—*J Amer Med Assoc* 1942 July 4 Vol 119 No 10 p 792

compared the visual results in 328 trachomatous patients in Illinois treated with sulphanilamide with those in 493 patients treated in other ways. He found that in the former group twice as many showed a definite improvement in their vision and less than half as many showed a deterioration.

Cornea—Thornwall DAVIS¹³ has described his experience of *superficial punctate parenchymatous keratitis* observed in 195 patients in America during the past 13 years. Mild or severe conjunctivitis in association with photophobia, lachrymation and conjunctival injection especially affecting the bulbar portion was the common characteristic. A sensation of a foreign body in the eye was experienced. Oedema of the upper lid and ptosis were occasionally met with. Careful examination of the cornea showed minute white flecks in the membrane wavy glass lines too were often observed. These opacities lay in the superficial layers of the cornea and did not involve the epithelium. Davis emphasizes this point and describes the disease as parenchymatous for this reason. Local treatment with phenacine and epinephrine and the use of the Shahan thermophore effected a rapid cure. Bacterial investigations all gave negative results. The author has furnished a comprehensive review of similar conditions met with elsewhere.

Glaucoma—In a review of the aetiology and treatment of glaucoma DAYAL¹⁴ stresses the importance of the vascular element in the causation of the disease and enumerates the factors which contribute to venous stasis and vasomotor disturbance. For acute congestive glaucoma he recommends a trap-door iridectomy. This is an operation which differs from the ordinary corneo-scleral trephining in that the trephined disc is replaced after performing iridectomy. For chronic forms of the disease he considers various conservative methods of treatment but unconditionally advises operation if loss of visual field occurs. He regards Elliot's operation as somewhat uncertain in its results and describes iridencleisis and Lagrange's operation. Cyclodiathermy is another operative procedure recommended by him. For glaucoma secondary to uveitis he performs iridectomy and for that following cataract extraction and dissection he recommends cyclodialysis.

DODDS¹⁵ has reported his experience of eye disease met with in an eye clinic at Lagos and based on the observation of 801 patients. Conjunctival disease heads the list with 206 admissions errors of refraction take second place with 189 and defective vision third with 170. Cataract accounted for 58 admissions. Trachoma spring catarrh and purulent ophthalmia were found to be the commonest conjunctival affections. 66 cases of trachoma were seen and the author found sulphonamides remarkably effective in their treatment. Entropion and trichiasis were seldom seen. Admissions for myopia and astigmatism were equal in number and those for hypermetropia slightly exceeded them. Asthenopia and vitamin B₂ deficiency appear to be

¹³ DAVIS (William Thornwall) *Superficial Punctate Parenchymatous Keratitis*—*Arch Ophthalmology* 1942, Feb. Vol. 27 No 2, pp 279-288 [15 refs.]

¹⁴ DAYAL (Sukh) *Aetiology of Glaucoma its Various Methods of Treatment and their Merits*—*Indian Med Gaz* 1942 Apr Vol 77 No 4 pp 233-240 [13 refs.]

¹⁵ DODDS (G E.) *A Report on an Analysis of Cases at an Eye Clinic in Lagos, Nigeria*—*Brit Jl Ophthalm* 1942, June Vol. 26 No 6 pp 257-265 [17 refs.]

responsible for the majority of the cases of defective vision, and cases of advanced vitamin deficiency were associated with a pallor of the temporal half of the optic disc. *H Kirkpatrick*

DE SILVA (A. J. L.) The Problem of Trachoma in Ceylon. With a Plea for its Suppression.—*Jl Ceylon Branch Brit Med Assoc* 1941 Dec Vol 38, No 4 pp 348-361 With 3 figs. on 1 plate [Summary appears also in *Bulletin of Hygiene*]

No detailed survey of the incidence of trachoma in the central province of Ceylon has as yet been carried out. For the period January 1939 to May 1941 50 cases were seen at the Eye Institute, Kandy whilst in Akurana, a village predominantly Muslim 17 cases were found amongst 636 persons examined. The author believes that trachoma is spread into Ceylon by infected immigrants and that the bazaar areas of the larger towns are the sources of propagation. A series of public health measures on the lines adopted by other countries is suggested. *Arnold Soraby*

GOXES (Luis de Salles) & JORDÃO (Sylvio) Sobre a reacção de Weil-Felix no trachoma. [The Weil-Felix Reaction in Trachoma].—*Brasil Medico* 1940 Mar 9 Vol 54 No 10 pp 151-159 English summary [Summary appears also in *Bulletin of Hygiene*]

The author tested the sera of 235 patients with trachoma in various stages for the Weil-Felix reaction with *Proteus OXK*, *P. OX19* and *P. OXL* and, as controls, of 30 normal persons giving no history of either trachoma or typhus infection. The cases were classified according to MacCallan's clinical stages. Of these 18 were stage I, 138 stage II (2 of these were verging on stage III), 69 of III and 12 of IV. Altogether 42.3 per cent. were positive in 1/200 dilution or more and of those in stages II and III 42.7 per cent. Of the normal sera 20 agglutinated *Proteus OXK* in dilutions up to 1/100, hence anything under 1/200 should, in the author's opinion, be disregarded.

As regards the individual organisms *Proteus OXA* was agglutinated in 38.9 per cent. of all the cases and in 38.3 per cent. of those in stages II and III. *Proteus OX19* in 15.2 and 15.5 per cent. respectively and *Proteus OXL* in 0.9 per cent. for those in stages II and III or in all four. Seven agglutinated *Proteus OXK* in a dilution of 1/400, two *Proteus OX19* in the same titre, none agglutinated *Proteus OXL* in a high a titre as this.

Clearly, therefore, the reaction is not a dependable one for the diagnosis of trachoma in any stage. *H Harold Scott*

MISCELLANEOUS.

MURCOWSKI (J.) Die Seuchenlage im europäischen Russland. [The Epidemic Diseases of European Russia].—*Ved Klin* 1942, July 3 Vol 38 No 27 pp. 625-629 [Summary appears also in *Bulletin of Hygiene*]

The author claims to have obtained his information from official Russian reports. He gives no references to original papers in the

Russian literature Diseases are grouped under four headings — (1) Diseases of the respiratory system (2) Diseases of the alimentary tract. (3) Diseases spread by direct contact (4) Diseases transmitted by animals [including insects]

In the first group scarlet fever and diphtheria are common and widespread Smallpox occurs in all areas but is most frequently found in the North-east the middle Volga region and in the Urals All these diseases are especially prevalent in winter

Of the alimentary diseases typhoid and the paratyphoids are the most common Typhoid is endemic and is more often found than paratyphoid B paratyphoid A however is more widespread in the south particularly between the Caspian Sea and the Don in the Ukraine and in the Caucasus Late summer is the season of maximum prevalence of these diseases Bacillary dysentery is widespread, but whereas in former years the Shiga Kruse form was common the type recently found especially in 1941 has been that due to Flexner Y and E [presumably Kruse-Sonne] In the Ukraine the heavy incidence was due to the Shiga Kruse bacillus. The Baltic States have been relatively free but in White Russia the incidence is considerable high figures are reported from Karelia the Crimea the Caucasus Daghestan the Ukraine Trans-Caucasia and Uzbekistan The disease is at its height in summer Amoebic dysentery is practically absent from the Ukraine but is not rare in the Caucasus. Intestinal protozoa are found in profusion in Azerbaijan

Cholera is not endemic and has not been reported since 1927 Earlier than that however it had been found in the Ukraine and had spread to Poland and Germany the possibility of its reappearance must be reckoned with especially round the Black Sea and the Caspian

Of the diseases spread by direct contact trachoma is one of the most common from the Baltic to the Black Sea Leprosy is important only in the three Baltic States and in these it is gradually dying out Syphilis is no more common in Western Russia than in the rest of Europe but is more prevalent in the Volga region The incidence of gonorrhoea resembles that elsewhere in Europe

Of the diseases transmitted by insects malaria is the most important In general benign tertian is the common form but in the south there is an area of subtertian malaria bounded to the north by a line between Kieff Voronezh, Saratof Samara and Orenburg Malaria is especially common along the coasts of the Black Sea and the Caspian in the country between these seas and in the valleys of the Dnieper Besna, Bug Ingoletz Don Donetz and the Volga There is a focus to the east of Moscow and the disease is found in the marshy country throughout Quartan malaria is rare in the Ukraine but is more common in the Caucasus and the Volga basin There is a malaria station as far north as the White Sea near Archangel in Karelia there are mosquitoes (*Culex* and *Aedes*) but no *Anopheles*

The Russians have created a strong organization for the prevention and treatment of malaria with institutes at Moscow Kieff Kharkov Dnepropetrovsk Odessa Tiflis Baku and other places The vectors in the Ukraine are *A. maculipennis messeae* and *atroparvus* *A. bifurcatus* and *A. hyrcanus* in the Caucasus *A. superpictus* *A. plumbeus* and *A. pulcherrimus* are implicated Blackwater fever is rare in the Ukraine but common in the Caucasus

Aedes aegypti is found in the Caucasus yellow fever is therefore theoretically possible there.

Typhus is the most prevalent disease after malaria and typhoid. It is louse-borne and is accompanied in places by relapsing fever and trench fever. The greatest incidence of typhus takes place in White Russia and to the east of Moscow throughout the area from the White Sea to the mouth of the Volga. The Baltic States are relatively free as are the Ukraine and the Caucasus. The maximum prevalence of typhus is usually found between January and March, but cases are reported throughout the year.

Sandfly fever is widespread in the Caucasus. It affects chiefly new comers and the indigenous children. The sandflies are found in the Crimea and along the shore of the Caspian but not on the Caucasian coast of the Black Sea.

Plague is associated with ground squirrels and rats. It is well known in the regions of the Lower Volga, North Caucasus and the Don near Rostov. These are old foci, and the disease has not recently spread from them. Tularemia is common in the south-east especially in spring when the water-rat holes are swamped in the floods, and the animals are caught for their skins.

Anthrax is fairly common in the cattle areas, especially in the form of a mild putrefaction. C IV

HARR (Sidney L.) *A Health Service among the Rural Bantu.*—*South African Med J* 1942 May 23 Vol 16 No 10 pp 197-198

In this short paper are brought out several points of great interest and importance to those who attempt to raise the standard of health in African natives. It is emphasized that the provision of curative medical facilities is at present insufficient to meet the needs of the Native Territories of the Union of South Africa and, moreover that curative services, which do not attempt to prevent or modify the basic causes of the important diseases must be brought within the sphere of a broader health scheme. On the other hand a purely preventive service would fail to impress itself on a people whose conception of a doctor is of one who can cure. Health instruction and curative medicine must therefore be combined and were so combined in the Health Unit formed by the author at Polela.

The people among whom the work was carried on fail to grow all their own food requirements, and exchange their labour for the goods they receive. They are as ignorant and conservative as other native communities and they suffer from the usual diseases: helminthic infections, dysentery, infant diarrhoea, typhoid fever and venereal disease. They also show evidence of malnutrition.

The Unit undertakes first to get to know the people by house visits. These routine visits unconnected with temporary illness, are considered more important than follow-up visits after disease which may quickly be forgotten once the disease is ended. A school health service has been instituted with clinical examinations of the children, supervision of sanitary arrangements, and the provision of school meals. The native teachers are ignorant of hygiene but special courses of instruction have proved successful in stimulating their interest. It is realized that school work alone will not succeed unless the parents understand the general principles and that therefore the house visits are essential. Clinics are held for curative purposes, special attention being paid to venereal disease.

Work is carried out in conjunction with the Agricultural Department and a model vegetable garden with compost pit and including simple anti-erosion measures has been instituted in the middle of the community. This is an important demonstration [and it may be expected that the common African faculty for imitation may help] but the author shows that he is fully aware of the fact that for success there must be cooperation between the Magistrate Medical Department education authorities missionary bodies and teachers.

C IV

HUECK (Otto) *Krankheitsverteilung in einem ländlichen Bezirk der Kwangtungprovinz [Diseases of a Rural District of Kwang Tung Province of China]*—*Deut Trop Ztschr* 1941 July 15 Vol 45 No 14 pp 427-436 [10 refs.]

The author gives records of 7 000 patients seen at his mission hospital in Tung Kung during a period of 8 years the population was occupied chiefly in agricultural pursuits. The principal diseases were as follows. Entropion and trachoma were very prevalent. Pulmonary tuberculosis was found, especially in school teachers but also among the peasants. non pulmonary tuberculosis of glands bones and joints was not uncommon. Malaria is not very prevalent and the principal form is benign tertian though subtertian exists. [Nothing is said of seasonal periodicity or of the common vectors.] Kala azar was not seen. Infection with *Clonorchis sinensis* was not rare and was more often found in the more wealthy town dwellers than in the peasants. Ascaris infection is widespread and hookworm disease is common in the peasants.

Typhoid is endemic but cholera has not been seen recently. plague has not appeared for many years. Leprosy more a disease of country than of town dwellers is often observed, but its prevalence is hard to estimate.

Beriberi was diagnosed in a number of cases. Cirrhosis of the liver was fairly common its aetiology is obscure and it is not apparently connected with the presence of *C sinensis*. Venereal diseases are fairly prevalent in the towns. Skin diseases of many kinds are rife and ulcer of the leg is frequently seen. The fevers of childhood occur here as in most other countries.

C IV

GLEITSMANN (Hans Wilhelm) *Pyomyositis tropica = Pyomyositis trophica?*—*Arch f Schiff u Trop Hyg* 1940 July Vol. 44 No 7 pp 301-315 [35 refs.]

As a clinical description and a general account of pyomyositis this article is good. From this point of view however it gives no more information than may be found in the better text books. The author discusses the correctness of the name of the disease according to some ZIEMANN and MENSE for example it is confined to the tropics according to others it exists in non tropical countries also. RUGE and DE BARRES are among the supporters of this view and SCHÖNBRUNNER claims to have seen it in Vienna and HOLM in Sweden. Hence there naturally arise the questions. Are these muscle abscesses of the same origin in the tropics as in temperate climates? Or are they the same even in the different tropical regions where they are met with? Or

types of drugs for an average of 7.7 weeks one case failed entirely to respond to sulphanilamide and possibly a fungus was present although it was not demonstrated. Ulcers superimposed on a background of varicosities phlebitis arteriosclerosis or syphilis also failed to heal but sulphonamide may be useful in such cases as an adjunct to other forms of therapy. The local use of sulphonamide might be worth trial but it was not used in the present series. *F. Uragatroyd*

HAMBURGER (H. J.) Sulphonamides in Topical Application.—*Indian Med Gaz* 1942 Mar Vol 77 No 3 pp. 135-139 [23 refs.]

In this paper the author discusses the local treatment of wounds and infected tissues with sulphonamide drugs and gives a résumé of some of the literature on the subject. He refers to his own experience in the treatment of 120 cases of frontier sore a condition superficially resembling cutaneous leishmaniasis, but in which leishmania are not found and of impetigo varicose ulcers and infected injuries, with details of illustrative cases. Comparison with other methods of treatment is not given in detail, but the general impression is that response to the sulphonamide treatment is good and often dramatic. Early trachoma responds well to local application of sulphonamide to the conjunctiva but when advanced does not respond. Cutaneous leishmaniasis shows no improvement under this treatment.

The preparations used were 6 per cent. soluseptamine ointment prontosil soluble 1 to 5 per cent. prontosil base ointment 5 per cent. or powdered drugs either as powder or incorporated in glycerin for paints or in petrolatum for ointments. For ophthalmic work the finest ointment-bases should be used and the sulphonamide should be in a strength of not more than 1 per cent.

[For the author's previous work on frontier sore see this *Bulletin* 1940 Vol 37 pp. 223-812.] *C. H.*

MUWAZI (E. M. K.) & TROWELL (H. C.) in collaboration with R. S. F. HENNERSEY Liver Diseases and Jaundice in Natives of Uganda.—*East African Med J* 1942 May Vol 19 No 2 pp. 40-66 [10 refs.]

[The bulk of the work reported in this paper was done by the first named author who also prepared the first draft. It is pleasant to realize that the African Assistant Medical Officers are engaged not only on routine medical work, but also on original scientific investigations.] The authors report 71 cases of liver disease or jaundice treated in their wards in one year but exclude from consideration cases of secondary infective hepatitis, such as follows pneumonia relapsing fever and other acute infections and which is probably the commonest liver disease in Africans.

The following are the most important conditions seen—*Common infective hepatitis* of which a small epidemic of seven cases is described. Leptospirosis, though not rigidly excluded, was unlikely and mouse protection tests for yellow fever were negative in the one case investigated by this method. There were a few cases of *syphilitic* and *amoebic hepatitis*. *Toxic hepatitis* was diagnosed in 13 cases neomycinphenamine accounted for 4 T.A.B. inoculations probably for 2, other chemicals for 2, and the cause was unknown in 5. No anthelmintic was incriminated, a reassuring fact. The differentiation of infective and toxic

hepatitis from yellow fever is difficult and the authors give their opinion that every case believed to be common infective hepatitis should be investigated by mouse protection test early in the disease and again after the tenth day to see if yellow fever immune bodies have appeared in the blood. There is a pathological note on toxic hepatitis.

Seven cases of *portal cirrhosis* and eight of *toxic cirrhosis* are described the aetiology of the latter is that of toxic hepatitis. *Syphilitic* and *bilharzial cirrhosis* accounted each for one case. There is a pathological note on cirrhosis. *Primary hepatic carcinoma* was found in nine cases and the authors think that toxic cirrhosis of post degenerative type probably leads to carcinoma.

There were 19 cases of *haemolytic jaundice* the reasons for the haemolysis were obscure but liver injections cured the anaemia and reduced the jaundice and liver enlargement. Malaria was apparently not a factor in the cases reported and obvious cases of haemolysis due to malaria which are of course common are not included in this survey. The anaemia in these cases of haemolytic jaundice is believed to be due to a combined dietetic deficiency of both extrinsic factor and iron.

Clinical details of these conditions are given and the pathological and haematological findings merit attention but cannot be abstracted satisfactorily. C IV

KOLB (Lawrence C) *Multiple Sclerosis in the American Negro* — *Arch Neurology & Psychiatry* 1942. Mar Vol 47 No 3 pp 413-421 With 1 fig. [12 refs.]

Observations in Baltimore over a period of eleven years showed that multiple sclerosis is as frequent in the negro as in the white population the respective relative rates of incidence being 17.7 and 16.8 per 100 000. These general rates compared closely with those obtained in the smaller Eastern Health District where 25 per cent of a total population of 108 000 are negroes. The disease was seen with equal frequency in negroes of either sex.

During the period reviewed uniform diagnostic procedures were used and before a diagnosis of multiple sclerosis was accepted a predominant number of the following criteria was required —onset or symptoms between the ages of 15 and 55 a history of remissions and exacerbations of the disease subjective and objective sensory disturbances objective evidence of disease of the pyramidal tract or cerebellum, nystagmus slurred speech loss of abdominal reflexes retrobulbar neuritis presence of central scotoma, pallor of the optic discs and changes in the cerebrospinal fluid. The diagnosis was rejected if the case failed to fulfil these requirements or if another diagnosis was established through subsequent observations. All cases having a positive Wassermann reaction were also excluded although owing to the high incidence of syphilis in American negroes it is not unlikely that occasionally the two diseases may have co-existed.

It is suggested that the statement that multiple sclerosis is uncommon among negroes is merely an expression of opinion or rests upon analyses of inadequate data. It is impossible to state certainly whether the character and frequency of the disease in the American negro differ from those in negroes in their natural habitat. There are no adequate comparative studies from Africa and a careful review of large native populations abroad would appear desirable.

F Murgatroyd

BÜNGER (W.) Ueber die Verbreitung des Rheumatismus in den tropischen und subtropischen Ländern. [The Distribution of Rheumatism in the Tropics and Sub-tropics.]—*Deut. Med. Woch.* 1942. Mar 13. Vol. 68. No. 11 pp 268-271

This paper describes the frequency with which the author found evidence of rheumatic conditions during his work in Brazil. It was apparently inspired by a paper by von BERGMANN in the same journal, claiming that a moderate temperature was part of the essential causative agent of rheumatic conditions, which therefore only very rarely occurred in tropical and sub-tropical regions. von Bergmann quoted American authorities to lend weight to his observations and suggested that climatotherapy should play a part in the treatment of rheumatism, and that it should be established for the treatment of such conditions in Greater Germany. The author takes exception to this suggestion and to the statements of the American writers, with which he confesses he is unfamiliar. He points out that no use of tropical or subtropical temperatures should be made in the treatment of rheumatism without an investigation into the incidence and pathology of rheumatism in the tropics. He claims here to provide the results of such an investigation.

He describes the various terrams of the State of São Paulo where he worked, and shows how they differ in temperature, climate and humidity. He was able to perform 601 post mortem examinations excluding those on children under 10 and lepers. Of these the majority were on poor coloured folk as it was difficult to obtain permission for autopsies from the higher social strata. The greater number of cases (403 in all) were from the city of São Paulo other came from the interior the coast and the dry northern uplands. In 34 of the 601 subjects (9 per cent) he found definite evidence of rheumatic conditions. The percentages in the different districts did not vary to any great extent. Later he made a further series of examinations aimed more especially at the discovery of rheumatic conditions and claims that in 207 examinations 29 showed rheumatic conditions.

He therefore concludes that von Bergmann's findings are wrong and that the value of climatotherapy for rheumatic conditions is doubtful.

The impression given by this paper is that the author's object was more to refute von Bergmann than to produce any concrete evidence on rheumatic problems. To those accustomed to English and American ideas on the aetiology of rheumatic conditions it is strange to find rheumatism of the heart and joints always accepted as part and parcel of the same pathological process. It is also difficult to accept the author's categorical statement that all his work in Brazil goes to add further proof to the theory that the alpha and omega of the cause and treatment of rheumatism is the presence of a focus of infection its discovery and its eradication.

W. Tegner

SALDERS (G. M.) & BANCROFT (Huldah) Blood Pressure Studies on Negro and White Men and Women living in the Virgin Islands of the United States.—*Amer. Heart J.* 1942. Mar. Vol. 23. No. 3 pp 410-423. With 3 figs. [15 refs.]

Blood pressure records were made of 4,913 inhabitants of the Virgin Islands, representing 50 per cent. of the population over 15 years of age and made up of 4,374 negroes and 539 whites. The readings were made with a standard mercury sphygmomanometer with the patients either sitting or reclining and the appearance of the first

sound was taken as indicating the systolic pressure and the change in the sound as the diastolic pressure.

The mean systolic level for male negroes rose steadily from 120 mm between the ages of 15 and 19 to 164 mm. at 65 to 69 years of age after which there was a decrease. The mean systolic pressures in female negroes were essentially the same as those of males up to the age of 35 years after which there was a more rapid increase than in the males until a peak of 184 mm. was reached at 70 to 75 years of age after which a decrease occurred.

The systolic pressure of the white persons likewise increased with age. Statistical analysis showed that the increase in mean systolic pressures associated with advancing age was not due to increasing weight. Standardized for age the pressure for both sexes among the negroes was considerably higher than among the whites. The male negroes had a mean systolic pressure some 12 mm. higher than male whites and the female negroes a similar increase over the female whites.

Yaws does not occur in the Virgin Islands but as 16 per cent of the population representing 18 per cent of the negroes and 4 per cent of the whites suffer from syphilis a comparison was made of pressures in negroes who had positive serological reactions with the pressures in negroes who had negative reactions. The mean systolic pressures for males and females with syphilis were appreciably higher than those of persons without syphilis but when the pressures were standardized for age there was no significant difference because the syphilitic subjects represented an older group in which higher blood pressure was to be expected.

The diastolic pressures of female negroes were significantly higher than those of corresponding male negroes while the pressures in whites which were significantly lower than those of negroes showed little difference between males and females. In all groups there was an appreciable increase with advancing age but the rate of increase of the mean diastolic pressure was less than that for mean systolic pressure.

In the Virgin Islands the negroes have much higher and the whites slightly higher normal blood pressures than published standards for North America and compared with residents of the U.S.A. a greater percentage of the negroes have systolic pressures above 150 mm. or below 110 mm. The excess of low blood pressure may be a result of climate and general environment as it is fairly generally agreed that blood pressure is lower in a tropical environment than in colder localities. As the inhabitants of the Virgin Islands are not subject to the stress and hurry of modern civilization some other explanation must be invoked for the higher pressures and as the islands are poor and do not yield agricultural products in any quantity it is suggested that poverty with its associated vitamin deficiencies, may explain the tendency to raised blood pressure.

F Murgatroyd

DE WAAL (H. L.) South African Senecho Alkaloids. Part 5. Notes on Isatidine, Rosmarinic and Pterophine, and on the Structure of their Nectines and Necto Acids.—*Onderstepoort J. Vet. Sci. & Animal Industry* 1941 Jan & Apr Vol 16 Nos 1 & 2 pp 149-166 With 3 figs [18 refs.]

This article deals entirely with the chemical aspect of the subject which though important will not appeal to readers of this *Bulletin*

H Harold Scott

STERN (DOUG G.) & VAN DER WALT (S. J.) Recent Investigations into the Toxicity of Known and Unknown Poisonous Plants in the Union of South Africa, XI.—*Onderstepoort J. l. d. Sci. & Animal Industry* 1941 Jan. & Apr. Vol. 16 Nos. 1 & 2 pp. 121-147 With 7 figs. [18 refs.]

The authors have carried out investigations and experimental work on 16 species of plants in South Africa. Three were definitely proved to be poisonous, viz. *Senecio pterophorus*, *Kalanchoe paniculata* and *K. thyrsiflora*. Ictidine and retrorsine alkaloids of *Senecio* produced all the symptoms of and the same histological changes observed in a disease of horses known as *dunstable*. Two other species, *Crotalaria rhodesiae* and *Pseudogallium elatum* may be but have not yet been proved to be poisonous. All the work referred to in this article has been carried out on animals. See *Bull. of Hyg.*, 1936 Vol. 11 p. 849 1937 Vol. 12, p. 898 1941 Vol. 16 p. 137 and this *Bulletin* 1941 Vol. 38 p. 421
H. Harold Scott

ROY (D. N.) & GHOSH (S. M.) A New Active Constituent of Pyrethrum Flower. Correspondence—*Nature* 1942, Aug. 1 Vol. 150 No. 3798 p. 153 With 1 chart

It has usually been held that the insecticidal property of extracts of pyrethrum is due to the pyrethrins, but the authors have found, in a series of tests with *Musca vicina*, that there is no direct relation between the proportion of insect kills and the amount of pyrethrum in the extracts and that a smaller amount of pyrethrum extracted from a sample of pyrethrum with a high pyrethrum value produces better results than a larger amount from a poorer sample. They therefore assume that the lethal principle is not pyrethrum but is probably a substance which exists in larger amounts in samples rich in pyrethrum. It is probably an independent body whose growth in the flowers is very likely regulated by the same factor as pyrethrum. It is soluble in kerosene (which was used in the experiments but which is not itself lethal)
C. H.

ANDERSON (W. M. E.) Anti-Sandfly Spraying with Lethane and Pyrethrum.—*Jl. Roy. Army Med. Corps.* 1942, July Vol. 79 No. 1 pp. 12-24 With 2 figs.

The work was carried out in Peshawar N.W. India rooms being sprayed with certain dilutions of Lethane 384 and with various extracts of pyrethrum. Sandflies were numerous, the majority of them *Phlebotomus fatigans*. The spraying was done with small hand machines, and also with Phantom 1s, which fill the room with a fine mist of insecticide. As a result of his work the author recommends the use of either Lethane 384 diluted 1/68 or "1/100 Pyefly". The actual amount of Lethane to be used is not stated, but the reader can calculate it from the body of the paper—we have not found it possible to calculate the final concentration in pyrethrins or the quantity to be used per unit of space. The author refers to the "repellent effect" of the insecticides. His tables show that certain doses of either of these insecticides reduce the number of sandflies for 12 hours, or occasionally a longer period. This either shows that the insecticide only kills a small proportion of the insects, or that others move into the room after treatment but it is not evidence that the materials are repellent.

P. A. Baxton

INDEX OF AUTHORS OR SOURCES

The bracketed abbreviations after the page numbers indicate the subjects.
Page numbers within brackets indicate papers not summarized

Am. signifies	Amoebiasis and Amoebic Dysentery
Bb	Beriberi
Bl.	Blackwater
B.R.	Book Review
Chl.	Cholera
Der.	Tropical Dermatology
Diet.	Deficiency Diseases including Epidemic Dropsy
Dys.	Dysentery (Bacillary and Unclassified)
Fev	Fevers.
Haem.	Haematology
Hol.	Helminthiasis.
Leish.	Leishmaniasis.
Lep	Leprosy

Lept. signifies	Leptospirosis.
Mal.	Malaria.
Misc.	Miscellaneous.
Oph.	Tropical Ophthalmology
Pel.	Pellagra.
Pl.	Plague.
Rab	Rabies.
R.B.F.	Rat Bite Fever
R.F.	Relapsing Fever and other Spirochaetoses
Sp	Sprue
Spec. Res.	signifies Special Research.
Tryp	signifies Trypanosomiasis.
Typh.	Typhus.
Vms.	Venoms and Antivenoms.
Y F	Yellow Fever
Y & S	Yaws and Syphilis.

A.

Abbu C. with Raman, 403 (Oph.)
 Abedin, Z. with Pasricha, 407 (Vms.)
 — with — & Paul 168 (Chl.)
 Accousti, N. J. with Martin & Thompson
 464 (Hel.)
 Ackert, J. E. 624 (Hel.)
 Adak, B. with Lal Das Gupta & Agarwala,
 340 (Diet.)
 — with — & Mukherji, 340 (Diet.)
 Adams A. R. D. 172 (Leish.)
 Adams, C. C., with Swartzwelder 600 (Mal.)
 Adams, G., with Ashworth, 164 (Chl.)
 Adler S. 607 (Leish.)
 — & Ber M. 174 451 (Leish.)
 — & Tchernomoretz, I. 173 748 (Leish.)
 524 (Mal.)
 Africa, C. M. & Dy F. (438) (Mal.)
 — & Sonano L. J. 27 (Mal.)
 — & Garcia, E. Y., 467 (Hel.)
 Agarwala, S.P., with Lal Das Gupta & Adak,
 340 (Diet.)
 Aguilar J. A., 707 (Hel.)
 Aguila, P. J. with Tubangui, 467 (Hel.)
 Aguilar F. J. 706 (Hel.)
 Aguirre Pequillo R., 642 (Der.)
 Ahmed, I. with Smith 448 (Leish.)
 — with — & Halder 447 449 (Leish.)
 Ahmed, N. (711) (Diet.)
 Akashi, K. & So T. 394 (Mal.)
 Akrel I. S. with Uzman & Tunçman, 84
 (Rab.)
 Alameda County (55) (Misc.)
 Albarradin, L. 558 (Lep.)
 Alberto Castro C. 623 (Lep.)
 Aldridge A. G. V. 165 (Chl.)
 Alessandri, H., Garcia Palarnelos, P. &
 Lerner J. 710 (Diet.)
 d Alessandro G. & Sicari S. 258 (Mal.)

Alexander R. A. with Neltz & Mason, 757
 (Typh.)
 Alexandrov Y. M. 250 (Mal.)
 Alicata, J. E. 614 (Typh.)
 Allen, D. with Miller 781 (Hel.)
 Allison, B. J., 631 (Hel.)
 Almolda, F. & Barbosa, F. A. S. 107 (Der.)
 Altachulo M. D. & Gilligan, D. R. 274 (Bl.)
 Alvarado C. A., 689 (Pl.)
 Alvarez, M., with Romero Escacena &
 Bollnches, 540 (Typh.)
 Amaral, A. D. F. & de Lima P. 465 (Hel.)
 d Amato H. J. 763 (Pl.)
 Amin, B. M. with Dhayagude 707 (Hel.)
 Anderson C. 591 (Rab.)
 — Berge C. Fauconnier H. & Runacher
 A. 342 (R. F.)
 Anderson, C. R. with Snyder 374 (Typh.)
 Anderson D. E. W. & Cruckshank, R., 34
 (Dys.)
 Anderson, H. H. with Chen, 126 (R.F.)
 — with Chin, 795 (Misc.)
 — with Soong 171 (Leish.)
 Anderson, L. A. P. 83 (Rab.) 161 (Chl.)
 Anderson, W. A. D. & Morrison, D. B. 741
 (Mal.)
 — with — 604 741 (Mal.)
 — & Williams, E. F. Jr 611 (Mal.)
 Anderson, W. M. E. 155 (Fev) 900 (Misc.)
 Andrews, J. 772 (Hel.) 836 (Am.)
 Angula, L. N., (41) (Y & S.)
 Antognini, R. 44 (Sp.)
 d Antoon, J. S. 841 (Am.)
 Arantes, J. B. & Nélva C., 405 641 642
 (Vms.)
 — with — 403 444 (Vms.)
 Arantes, S. C. 170 (Leish.)
 Araujo, H. C. de S. 462, 558 (Lep.)
 Arce J. (706) (Hel.)
 Archetti I., 17 (Mal.)

Arnett, J. H., with Wentrach, 554 (Am.)
 Arnold, H. L. J. 224 (Lep)
 Arnold, L. 57 (Dys)
 Arnaud, E. with Poltier Dureux & Joubert
 781 (Y F)
 Asai, M. 120 (Mal)
 Ashburn, L. L. 634 (Hel)
 Asher C. with Sulzberger 782 (Y F)
 Ashworth, C. T. & Adams, G. 164 (Chl)
 Assam Medical Research Society Shillong
 423, 435 (Mal)
 Audoye H. with Berge, Fanconner & Berre
 703 (Hel)
 Auzat, C. & Dodero J. 82 bis (Rab)
 Augustino, D. L. (782) (Hel)
 Aximayer J. H. with Krakower & Hoffman
 562 (Hel)
 Aycock, W. L. & Hawkins J. W. 219 (Lep)
 Aykroyd, W. R. 325 (Bb)
 — & Krishnan B. G. 329 330 (Bb)
 Aylen D. with Ross 260 (Mal)
 Azavedo A. 815 (Mal)

B

Bablot, J. (79) 780 (Y F)
 Baccigalupo J. 192 (Hel)
 Baldwin, R. B. T. with Hughes, 756 (Typh)
 Ballero, S. 23 & (Mal)
 Bakonet, L. 561 562 (Rab)
 — with Durand 369 543 (Typh)
 Baltazard, M. with Blanc 576 (Misc)
 Bancroft, H. with Saunders, 808 (Misc)
 Banerjee, D. N. 162, 163 618 (Chl)
 Barbara, L. with Tolanos & Figueroa 245
 (Tryp)
 Barber C. H. 726 (B R)
 Barbosa, F. A. S. with Almeida, 107 (Der)
 Bard S. with Robertson & Chen (334) (Bb)
 Bardhan, P. N. 120 (Mal)
 Barma, P. N. S. Roy P. & Bhattacharya
 T. (620) (Am)
 Barnett, L. 85 469 (Hel)
 — with Meade 470 (Hel)
 Barrat, P. 668 (Oph)
 — & Berge C. 886 (Oph)
 — with — 886 (Oph)
 Barreto M. P. (611) bis (Lash)
 — with Coutinho, (611) (Lash)
 Bash, K. C. with Lal, Raja & Satya Swaroop
 57 (Chl)
 — with Satya Swaroop, Raj & Lal 167
 M. H. 483 (Hema)
 — G. with Mazza & Dasso R. 249 445
 (Tryp)
 Basso, R. with Mazza & Basso G. 249 445
 (Tryp)
 Batra, M. (253) 389 (Mal) (350) (Misc)
 Batra, B. L. 679 (Diet)
 Bauge R. 706 (Hel)
 Bauman, L. 842 (Am)
 Bautista, L. D. with Vitug & Cruz 11 (Hel)
 Bautista Serra, J. 845 (Am)
 Bayha, H. A. 777 (Hel)
 Beach, M. W. & Ravenel, B. O. 649 (Misc)
 Beahan, C. H. & Jorgensen, M. N. (478)
 (Hel)

Beams, A. J. Free, A. H. & Glenn, P. M., 234
 (Pel)
 Beas, W. B. Spec, T. D. & Blankenhorn
 M. A. 636 (Diet)
 — with Valtz & Spec, 574 (Diet)
 Beard, R. R. with McNaught & Myers, 194
 (Hel)
 Beck, M. D. with Davis & Wynne, 856
 (R F)
 Beckman, H. 439 (Mal)
 Beeson, P. B. 196 (Hel)
 Behrman, H. T. with Levin, 114 (Der)
 Belgrano, C. R. with Jacobo Spangenberg &
 Zúñiga 96 (Hel)
 Bell, G. J. 36 (Dys)
 Beltran, E. (400) 612 (Mal)
 — & Larena R. 309 (Mal) 619 (Am)
 — & Vargas, L. 670 (Mal)
 — with — (440) (Mal)
 Bendit, M. with Stannus, 342 (R F)
 Bengal Public Health Report, 458 (Chl)
 Bengtson, I. A. with Perrin, 530 (Typh)
 — & Topping, N. H. 146, 539 (Typh)
 Benson, M. E. with van Perin & Holinger
 109 (Der)
 Ber M. with Adler 174 451 (Lash)
 Berge C. with Anderson F. conner &
 Renacher 342 (R F)
 — Audoye H. Fanconner J. & Berre
 L. 703 (Hel)
 Berge C. & Barrat P. 888 (Oph)
 — with — 888 (Oph)
 Berge T. O. & Hargrett M. V. 686 (Y F)
 Berkman, J. M. & Magath T. B. 842 (Am)
 Berman, C. 486 (Misc)
 Bernkopf, H. & Khigler I. J. 79 (Rab)
 — with — 82 (Rab)
 Berre, L. with Berge Audoye & Fanconner
 703 (Hel)
 Bertin V. with Genc 246 (Tryp)
 Bertrand G. & Vladoeco R. 787 788 (Vms)
 Best C. A. with Coggeshall & Maier 395
 (Mal)
 Bett H. D. with Schutner R. J. & Seeben
 mann, 802 (Hel)
 Beckema, W. 630 (Mal)
 Bhaden N. V. with Maplestone 782 (Hel)
 Bhattacharjee, J. C. (274) 831 (Bt)
 Bhattacharya, A. K. & Gupta B. P. 660 (Chl)
 Bhattacharya, T. with Barma & Roy (620)
 (Am)
 Bianchi, C. 19 (Mal)
 Bichel, J. & Meulengracht, E. 337 (Pel)
 — with — 336 (Pel)
 Backhardt, R. with Otto, 638 (Typh)
 Badyadhar N. K. 401 (Oph)
 Billings, F. T. J. with Damma, 822 (Typh)
 Bishop T. H. (618) (Chl)
 Bishara W. N. 178 (Mal)
 Blacklock, D. B. 814 (Mal)
 — & Wilson C. 253 809 (Mal)
 Blacklock, M. G. 203 (Misc)
 Blair E. M. McV. with Wilson, 319 (Dys)
 Blanc, G. & Baltazard, M. 578 (Misc)
 Blanco, C. M. 313 (Am)
 Blankenhorn, M. A. with Bean & Spec, 636
 (Diet)
 Block, L. H. Tarnowski, A. & Green, B. H.
 36 (Dys)

Index of Authors

- Bloss J F E. 851 (Lep.)
 Bobrovskaya, V V 324 (Dys)
 Bocalandro C A & Wilds H J 115 (Mal)
 Bodon G R. 101 (Hel.)
 Bobec, J (281) (Misc.)
 Bokhari A. with Woodman 183 (Hel.)
 Bokil, K V & Nargund, K. S (698) (Lep)
 — with Pandya & Nargund (698) (Lep)
 Bokma, H 403 bis (Vms)
 Boland, S J with O'Donovan & McGrath 692 (Dys)
 Boletín de la Oficina Sanitaria Pan
 americana 109 (Der)
 Bollnches, J with Romero Escacena &
 Alvarez, 540 (Typh)
 Bombay 300 (Pl)
 Bonne C 14 565 (Hel.)
 — Borstlap A J P de Moor C E &
 Molenkamp W J J & Nanning W 628
 — Nanning, W 629 (Hel)
 — (Hel)
 — Lie Kian Joe Molenkamp W J J &
 Mroyen F W 184 (Hel)
 Bopaiya, M. S & Rao M V R 603 (Misc)
 Boquet, P 788 (Vms)
 —, & Delannay A 834 (Vms)
 — with Ramon Richou & Nicol. 686
 (Vms.)
 v Bormann F with Hollack, J & Kurch
 hoffer E 894 (Misc.)
 Borstlap A. J P with Bonne Lie Kian Joe
 Molenkamp de Moor & Nanning. 629
 Molenkamp de Moor & Nanning 628 (Hel.)
 — with — & Nanning 628 (Hel.)
 — with — & Nanning 628 (Hel.)
 Bose P N 603 (Mal)
 Boston, R. J 377 (Typh.)
 Bowe, J C 635 (Diet)
 Boyd G H & Dunn M 439 (Mal.)
 Boyd, M F (292) 392, 429 430 (Mal.)
 Boyd, M F 493 (B.R.)
 — Kitchen, S F & Matthews, C B 431
 (Mal)
 Boyle A K 531 (BL)
 Boza, F V with Rusquez 500 (Hel.)
 Brackett S. with McMullen, 567 (Hel)
 Brahmachari, U N 537 (Leish)
 Braithford, J F 91 703 (Hel.)
 Brambilla, A 361 (Mal)
 Brambilla, A 90 (Hel)
 Brandt, F 50 (Misc.)
 Brandt, R. 50 (Misc.)
 Brás de Sá, 278 (Misc.)
 Brazzaville [Afrique Française Libre] 237
 (Typh.) 345 (R.B.F.) 375 (Typh)
 Breedlove H E. with Kiker 262 (Mal.)
 Brendel V with Homárek, 595 (Mal.)
 Brenner C. F. with Lefffield, 477 (Hel.)
 Bretz G with Tostes, 453 (Typh.)
 Briceño-Iragorry L 103 (Der)
 Brick M. A & Donohue, W L 571 (Hel)
 Bricker R. 442 (Typh.)
 Brindcliffe R. 442 (Typh.)
 Brisse, R. R. & Couch, J F 419 (Misc.)
 Bringham, G D 148 (Typh)
 Brinkman J (14) (Hel)
 British Empire Leprosy Relief Association
 229 (Lep.)
 British Medical Journal, 34 (Dys.) (47) (Sp.)
 (173) (Leish.) (309) (Pl)
 —, & Calo A. 473 (Hel)
 Broch, O J 278 (Misc.)
 Brooke M. L. 742 (Mal.)
 Brooks, G 883 (Vms.)
 Broom J C 357 (B.R.)
 Brown, H W & Otto G F 99 (Hel)
 — & Sheldone A J 180 (Hel.)
 Brown O J & Ware R L 436 (Mal.)
 Brown, T St & Nunnemaker J C. 693 (R.F.)
 Browne G St. J O (420) (Misc)
 Brownlee G & Tonkin I M 35 (Dys.)
 Brug, S L. 263 (Mal)
 Brum E. 8 886 (Hel.)
 Brumst E. 8 886 (Hel.)
 — & Desportes, C 829 (Typh.)
 Bryant, J 668 (Mal)
 Buchholz R R with Wyatt 32 (Am)
 Buchwald H 137 (Typh)
 Buchwald J J C 97 (Hel)
 Buckley J J C 97 (Hel)
 Bulletin of the Health Organisation (League
 of Nations) 277 (Misc)
 von Bulow T 608 (Typh)
 Bünge W 622 (Lep) 898 (Misc.)
 Buonomin, G 18 (Mal)
 Burke A W with Hughes & Jacobs, 455
 (X F)
 Burnet, E 621 622 (Lep)
 — & Cabasso V 857 (Lep)
 — Cuénod A & Natar R 888 (Oph.)
 Burney L E with Eagle Mays & Hogan,
 119 (Mal)
 — Mays J R S & Iskrant A I., 633
 (Mal)
 Bush, J D 105 (Der)
 Butler R L & Christenson, R O (628)
 (Hel)
 Bayton P A 308 (Pl)
 Bystritski, I A. 520 (Mal)
 G.
 Cabasso V with Burnet, 857 (Lep)
 Caceres, R. 249 (Typh)
 Caldas J M 10 (Hel.)
 Calder R. M. 368 (Fev)
 Calderón-Coervo H with Smith & Leyva
 77 (V F)
 Calh S J with Swartzwelder 786 (Misc.)
 Calo A. with Broc 473 (Hel)
 Calvo Meléndez J 96 (Hel)
 Campbell R. T with Kirk & Charlton, 457
 (Y.F.)
 Campbell Renton, M. L. 617 (Chl.)
 Campos, N S & Ribeiro E B 222 (Lep)
 Camacho J R. 5 (Hel.)
 Cannon, D A. 872 (Lep.)
 Cannon, D I with Derry & Wilson, 645 (Der)
 Card W I & Navajas E 248 (Typh.)
 Cardoso, F A & Meléndez, 247 (Typh.)
 — with Rosenfeld, 247 (Typh.)
 — with Cole 229 (Lep)
 Cardoso H. T., with Cole 229 (Lep)
 Carnal, A. 414 (Misc.)
 Carls V 628 (Hel.)
 Carls V 81 (Rab)
 Carneiro, V 81 (Rab)
 Carr H. P & Meléndez, J F 514 (Mal.)
 — & Meléndez, A. F., 513 (Mal.)
 — Ros, A & Meléndez, A. F 515
 (Mal.)
 Carrón, A. L. Ruiz Vazquez R & Hernandez
 Morales, F 110 (Der)
 Carruthers, L B 838 (Chl.)

Index of Authors

Friedheim E. A. H. 444 818 (Tryp.)
 Friedlander J with Dormer 31 (Am.)
 Frontali, G 709 (Diet.)
 Frota P with de Paula, 315 (Am.)
 Fulton, J D 815 (Mal)
 — with Devine 433 (Mal.)
 — & Yorke W 438 (Mal.) 533 (Tryp.)
 Furst, W with Schwartz & Flippin, 601 (Mal)

G

Gabalidon, A with Roseboom 431 (Mal)
 Gajardo Tobar R 641 642 (Vms.)
 Gale G W 302 (Pl.)
 Galliard H. & Dang van Ngu 13 (Hel)
 — & Ngu D 16 (Hel)
 Gallo P & Iturbe J 87 (Rab)
 Galvão, A L A & Coutinho J O 611
 Galves A with Dino & de Leon, 466 (Hel)
 (Leish)
 Garcia E with Estrada 101 (Hel)
 Garcia E Y 116 (Mal)
 Garcia E Y 467 (Hel)
 — with Africa 467 (Hel)
 Garcia J C 98 (Hel)
 Garcia Caballero A & Mayoral P 682
 (Fev)
 Garcia Capurro F 569 (Hel)
 Garcia Palazuelos, P with Alessandrini &
 Lerner 710 (Diet.)
 — & Lerner J 556 (Am.)
 Gast G & Bertin, V 248 (Tryp)
 Gast Galvis, A. 73 (Y.F.)
 Gault E S with Henderson & Spaulding
 767 (Lep)
 Gaupp H 706 (Hel)
 Gauran, M with Sédan Koutseff & Livon
 888 (Oph)
 Gautier R. 84 (Rab)
 Gavrilov, W with Dubois, 621 (Lep)
 Gear J 48 (Misc.)
 — with Dangerfield 108 (Der)
 — & Davis, D H S 750 (Typh)
 — Harris L. C. & Sauer R. G. 830 (Typh)
 — & de Meillon, B 152 (Typh)
 — with van Zyl, 238 (Tryp)
 Geldrich, J 673 (Leish)
 Gelfand M. 10 699 (Hel)
 Gelfand M. J & Try H. T. 177 (Mal)
 Genevray J with Chandhuri, 719 (Vms)
 Ghosh, B. N with Chandhuri, D K 405
 — De S. S & Chandhuri, D K 405
 (Vms.)
 — & Chowdhury D. K. 718 (Vms.)
 Ghosh H & Mukerjee S 690 (Chl.)
 Ghosh J & Roy B. 341 (Diet.)
 Ghosh R. K. 278 (Misc.)
 Ghosh S K with Panja, Malik & Paul, 839
 (Chl.)
 Ghosh, S M with Chandhuri 833 (Fev)
 — with Chopra & Roy 260 (Mal)
 — with Roy 900 (Misc.)
 — with — & Chopra, 785 (Misc.)
 — with — with Saldan de Rodriguez &
 Giampetro J., Soto 704 (Hel.)
 Gibbins E G 442 (Tryp) (632) (Hel.)
 Gildemester E & Haagen E 681 (Typh.)
 Gill G A 65 (Y.F.)
 Gillett, J D 650 (Misc.)
 — with Mahaffy Smithburn & Jacobs, 759
 (Y.F.)

Gilligan, D R with Altschule 274 (Bl.)
 Gilmore H R Jr. Kean, B. H & Posey
 F M Jr 796 (Misc.)
 Girard G 308 763 (Pl.)
 Giri K. V 574 (Diet.)
 — & Naganna B 336 (Pel.)
 Giroud P with Durand 548 (Typh)
 — with — & Sparrow 548 (Typh.)
 — & Panthier R 753 (Typh)
 Gispert R. 147 (Typh)
 Githens, T S 407 (Vms)
 Gletsman H W 893 (Misc)
 Glenn, P M with Beams & Free, 334 (Pel)
 Glösch E with Rivas, 706 (Hel.)
 Gohar M A 181 (Chl)
 Goldberger J with Sotolongo 647 (Misc.)
 Golden, R. with Lepore 337 (Pel)
 Goldstein, G 839 (Pl.)
 Gomez, B F with Verma 400 (Mal.)
 Gomez, J M 559 (Lep)
 Gomez, L de S & Jordão S 890 (Oph)
 Gomez, F B with Gutierrez, Navarro
 Morales & Lorenzo 460 (Y & S)
 Gomez Farias R 484 (Der)
 Gómez Plata C 558 (Lep)
 Gonzalo Guerra, 695 (Y & S)
 Gordon E F 252 (Mal)
 Gordon J & Johnstone K. I 617 (Chl.)
 Gordon, R M 54 (Misc)
 — Davey T H & Peregrino E P 515
 (Mal)
 Gracich Y S 517 (Mal)
 Gracie H S 888 (Oph.)
 Grana, A. & Schenone B. H. 705 (Hel)
 Grasset, E 311 312 (Pl.) 407 (Vms)
 — with Davidson, 232 (Lep)
 — with Pine 311 (Pl.)
 Green B. H. with Block & Tarnowski, 36
 (Dys)
 Greenfield J G with Hawking 235 (Tryp.)
 Greenfield, S H with Culbertson, 631 (Hel)
 Greengard, J & Hess, E. R. 127 (R.B.F.)
 Greval, S D S 481 (Lep)
 — Chandra, S N & Das, B C. 94 bis
 (Hel) 461 (Lep)
 — Das, B C & Sen Gupta, P C. 225
 (Lep)
 Griffiths, J J 764 bis (Chl)
 Gromashevskii L W 141 (Typh)
 Groot H 452 (Typh.)
 — Mayoral P & Martinez L E. 140 678
 (Typh.) 548 683 bis (Fev)
 Guerra G 41 (Y & S)
 Guillerme, J with Chaumand, 230 (Lep.)
 Guilmardes R. with de Magalhães, 409 (Vms.)
 Guindy 161 (Chl.)
 Guinto R. with Doell, Rivera, Saunders &
 Morales, 219 (Lep.)
 Guinto R. S & Rodriguez J A 216 217
 (Lep)
 Gunawardene S R. with de Saram, 570
 (Hel)
 Gupta B P with Bhattacharya, 690 (Chl.)
 Gupta, J C. with Chopra & Sen 235 (Mal)
 Gupta P C S with Napper 748 (Leish)
 Gupta S K. with deMonte 164 (Chl)
 Gutierrez, P D Navarro R. J. Morales
 S B., Lorenzo A. A. & Gomez, F B. 460
 (Y & S)

H.

- Haagen, E. with Giddemester 681 (Typh)
 Habel, K 51 (Rab)
 Haddow A J 895 (Mal)
 — with Symes & McMahon, 577 (Misc)
 Haga, J (620) (Am)
 Hahn, P F with Yule Steenman & Clark, 76 (Br)
 Hailey H with Emmons & Hailey Hugh, 106 (Der)
 Hala, H L 571 (Hel)
 Halder K C with Smith & Ahmed, 447 449 (Leish)
 Halmann, L 678 (Typh)
 Hamberger H J 866 (Misc)
 Hampel, B with Fitzpatrick 674 (Typh)
 Hand, R F with Southwell-Sander 363 (Mal)
 Hanks J H 220 (Lep)
 Hare K P 418 (Misc)
 Hargett, M V 438 (Y F)
 — with Berge, 686 (Y F)
 Hargreaves, W H & Mackenzie h. G F 409 (Vms)
 Harley G W (493) (Misc) 724 (B R)
 Harris, L C with Gear & Sauer 630 (Typh)
 Harris, S & Harris, S J 637 (Sp)
 Harris, S Jr. with Harris, 637 (Sp)
 Hartman, H R. & Kyser F A 32 (Am)
 — & Comfort, M W 621 (Am)
 Hawking, F 125 (R F) 534 (Tryp)
 — & Greenfield, J G 235 (Tryp)
 — & Smiles, J 238 (Tryp)
 Hawkins, J W with Aycock, 219 (Lep)
 Hayman, R W & Holt, G W C 203 (B R)
 Hayward, J C with Hark & Souter 45 (Sp)
 Hearin, J T 93 (Hel)
 Hegner R West, E Ray M & Dobler M 124 (Mal)
 — & Dobler M 396 (Mal)
 Heilig, R 869 (Hel)
 — & Naidu, R 375, 827 (Typh)
 Henderson, H J 786 (Lep)
 Henderson, R G Pinkerton, H & Moore, L T 645 (Der)
 Hennessey R S F with Mowat, 413 (Misc)
 — with Muwan & Trowell, 896 (Misc)
 Henriquez, A 551 (Pl)
 Henry A F X (256) (Mal)
 Hernandez Morales, F with Carrón & Ruiz Nasario, 110 (Der)
 Hernandez Ordoñez, J 648 (Misc)
 Hertig, M 831 (Fev)
 Hess, A D & Tarrwell, C M 604 (Mal)
 Hess, E R with Greengard, 127 (R B F)
 Hetsch, H 548 (Typh)
 Hewer T P 65 (Y F)
 — with Davies 487 (Misc)
 Hewitt, R with Hurlbut, 235 (Mal)
 — & Hotcher E 281 (Mal)
 Hicks, H M with Hoff, 792 (Misc)
 Hill, T R 803 (Mal)
 Hiltman, R V 577 (Hel)
 Ho, E A Chn, H J & Yuan, I C 169 (Leish)
 Hoang Tsch-Try with Dodero, 82 (Rab)
 Hoch, P., Kasch, E & Coggeshall, L T 20 (Mal)
 Hodgkin, E. P., with Tweedie & Reid, 522 (Mal)
 Hoff A. & Hicks, H M., 792 (Misc)
 Hoffman, W A 350 (Misc)
 — & Janer J L, 561 (Hel)
 — with Krakower & Aximayer 562 (Hel)
 Hogan, R B with Eagle Mays & Burney 119 (Mal)
 Holmger P H with van Pernis & Benson, 109 (Der)
 Holder H J with McElvie & Kirk, 401 (Oph)
 Hollack, J with v Bormann & Kirchbölser 864 (Misc)
 Holland, G P 306 (Pl)
 Holm, B 670 (Br)
 Holt, G W C with Hayman, 205 (B R)
 van Hoot, L 38 (Y & S) 815 (Tryp)
 Hopkins, E D with Donovan, 312 (Pl)
 Hopkins, G H E 391 (Mal)
 Hoque, A. K. M (555) (Am)
 Hoenby H E., 242 (Tryp)
 Hoakins, W M., 490 (Misc)
 Hotz, H W & Deucher W. G., 44 (Sp)
 Howe C 386 (Fev)
 Hoyne, A. L. & Lammore G. W., 466 (Misc)
 Hrad, O., 609 (Leish)
 Hu, S. M E 185 708 (Hel)
 Human, N with Mendez, 432 (Mal)
 Huang, M S with Kuo, 338 (Pl)
 Huard, 127 (R B F)
 Hubble, D 464 (Hel)
 Hudson, J R with Daubney 533 (Tryp)
 Hudson, N P 163 (Typh)
 — with Riddle & Spies, 339 (Pl)
 Hueck O 893 (Misc)
 Huff C G 124 (Mal) (351) (Misc)
 Hughes, T P Jacobs, H R & Burke A W 455 (Y F)
 — with Mahaffy Smithburn & Kirk, 456 (Y F)
 — with Lewis & Mahaffy 685 (Y F)
 Hughes, W., 802 (Mal)
 — & Baldwin R. B T 736 (Typh)
 Hühne W 663 (Mal)
 Humphreys, D R 864 (Hel)
 Humphreys, E M & Donakison, L 40 (Tryp)
 Humphreys, R M 749 (Leish)
 Hundertmark, A with Weyer 428 (Mal)
 Hurlbut H S (295) (Mal)
 — & Hewitt, R 295 (Mal)
 Hurst, A (637) 713 (Sp)
 Hutton J G 150 (Typh)

I.

- Indian Medical Gazette, 782 (Hel)
 Innes, J R M with Darcy 861 (Hel)
 International Journal of Leprosy (235) (Lep)
 Ioff I G., 725 (B R)
 Ishii, N Shimizu, S. & Tsoda, K., 126 (B F)
 Iskrent, A P with Burney & Mays, 665 (Mal)
 Itakura J 90 (Hel)
 Irr M G 168 (Leish)
 Itosa, O A (771) (Hel)
 Iturbe, J with Gallo, 57 (Rab)
 Iyengar M O T 477 (Hel)

J

- Jack, R. W., 443 bis 817 (Tryp)
 Jacobi & Dörschel, 754 (Typh)
 Jacobi, J. 758 (Fev)
 Jacobo Spangenberg, J. Belgrano C. R. & Zunino E. 96 (Hel.)
 Jacobs H. R. with Hughes & Burke, 455 (Y F)
 — with Mahaffy Smithburn & Gillett, 759 (Y. F)
 Jacobs, L. with Chunn, Reardon & Rees, 765 (Am.)
 — with Jones, 192 (Hel.)
 — with Rees & Reardon, (482) (Misc.)
 — with — — & Jones 28 (Am.)
 Jacovacci, R. 433 (Mal)
 Jalkanen S. S. with Dharmendra, 226 (Lep)
 Jameson J. E. 556 (Am.)
 Janer J. L. with Hoffman, 561 (Hel.)
 Jayaram, S. S. with Dayala, 317 (Am)
 Jegers H. 880 (Diet.)
 de Jesus, P. I. 19 (Mal)
 Jettmar H. M. 122 (Mal)
 Jiménez, J. F. 156 (Fev)
 Jiménez Diaz C. & Castro Mendoza H. 170 (Leish.)
 Job T. J. 633 (Hel.) 688 (Mal)
 Jocson C. T. 376 (Typh.)
 Johansen, F. A. with Faget, 698 (Lep)
 Johnson, H. A. with Knowles & Parker 123 (Mal)
 Johnson, H. N. & Leach C. N., 591 (Rab)
 Johnson, L. V. 404 (Oph.)
 Johnstone K. I. with Gordon 617 (Chl.)
 Johnstone, R. D. C. 369 (Hel.)
 Jonchère H., with Pelletier Durieux & Arquid 761 (Y. F)
 Jones E. B. 883 (Haem.)
 Jones, F. with Rees, Reardon & Jacobs 28 (Am.)
 Jones, J. with Faust & Thomas 189 (Hel.)
 Jones, M. F. with Cram & Reardon, 191 (Hel.)
 — & Jacobs L. 192 (Hel.)
 Jordan, J. H. & Sulvey W. J. 122 (Mal)
 Jordillo S. with Gomes, 890 (Oph.)
 Jorg, M. E. with Maxze, (537) (Tryp)
 Jorgensen, M. N., with Boehm, (478) (Hel.)
 Journal of the Association of Medical Women in India, 297 (Mal)
 Journal of the Indian Medical Association 196 (Hel.)
 Joyeux, C. with Vielle 379 (Typh.)
 Julianelle L. A. & Smith, J. E. 857 (Oph.)
 Junge W., 873 (Hel.)
 Junior M. de S. (551) 687 (Pl.)
 Junqueira M. A. with Costa, 107 (Der)

K

- Kahn R. L. McDermott E. B. & Marcus, S. 42 (Y & S)
 Kalabukhov N. I., 307 (Pl.)
 — & Raevskii, V. 307 (Pl.)
 Kämpfner R. H., 241 (Tryp)
 — & Larsen R. M. 721 (Misc)
 Kark, R. Souter A. W. & Hayward J. C., 45 (Sp.)

- Kark, S. L. 892 (Misc.)
 Karmawan R. with Street 787 (Misc.)
 Karunarathne W. A. E. 29 314 (Am.)
 Katzenellenbogen, I. 750 (Leish.)
 Kean, B. H. with Gilmore & Possey 796 (Misc.)
 Kennedy J. S. 181 (Mal)
 Kerley C. G. & Lorenze E. J. 635 (Diet.)
 Kessler W. R. with Culbertson 607 (Tryp)
 Khodukan, N. & Shtengold, E. 116 (Mal)
 Kiker C. C. & Breedlove H. E. 262 (Mal)
 Kikuth, W. & Mudrow L. 24 399 (Mal)
 — & Schmidt, H. 450 (Leish.)
 Kile R. L. & Welsh, A. L. 620 (Am.)
 Kingsbury A. N. 258 (Mal)
 Kirby Smith H. T. 720 (Vma.)
 Kirchhöfer E. with v. Bormann & Olack, 864 (Misc.)
 Kirmanwa, D. N. 325 (Diet.)
 Kirk, R. 69 (Y F) 609 (Leish.)
 — Campbell, R. T. & Charlton, R. 457 (Y F)
 — with Findlay & Lewis 457 (Y F)
 — with — & MacCallum, 455 (Y F)
 — with McKelvie & Holder 401 (Oph.)
 — with Mahaffy Hughes & Smithburn 456 (Y F)
 Kirwan, F. O. G. with Napier & Sen, 171 (Leish)
 Kitagawa, M. & Vazquez-Colet, A. 298 (Mal)
 Kitchen S. F. with Boyd & Matthews, 431 (Mal)
 Kugler I. J. & Bernkopf H. 82 (Rab)
 — with — 79 (Rab)
 — & Yoeli, M. 255 (Mal)
 Khnefelter H. F., 639 (Haem)
 Klose H. 675 (Typh.)
 Knipe, F. W., 181 (Mal)
 — with Russell 667 (Mal)
 Knoche E. 25 (Mal)
 — with Schulemann, 25 (Mal)
 Knowles F. L. Parker W. V. & Johnson H. A. 123 (Mal)
 Kobayashi, H. (185) (Hel.)
 Kolb L. C. 897 (Misc.)
 Komárek, J. & Brindl, V. 595 (Mal)
 Komp W. H. W. 430 (738) (Mal)
 Konda, A. with Poy & Mounjdis, 266 (HL)
 Kopp I. & Solomon, H. C. 665 (Mal)
 Koppach, E. 563 (Hel.)
 Kotcher E. with Hewitt, 281 (Mal)
 Koutsoff A. with Sédan, Lavon & Gauran, 888 (Oph.)
 Kouwenaar W. (146) (Typh.)
 Krakower C. Hoffman, W. A. & Axtmayer J. H. 562 (Hel.)
 Krishnan, B. G. with Aykroyd 329 330 (Bb)
 Krishnaswami A. K. with Venkatraman & Ramakrishnan, 160 (Chl.)
 Kubota, K., 159 (Chl.)
 Kufman, J. 648 (Misc.)
 Kuitunen Ekbaum, E. 192, 780 (Hel)
 Kumin, H. W., 296 (Mal)
 — & Ram, L. M. 296 (Mal)
 — & Rux, H., 290 (Mal)
 — Volos E. & Ruiz H. 291 (Mal)
 Kunert, H. 818 (Tryp)
 Kuo P. T. & Huang M. S., 338 (Pel.)
 Kuach, E., with Hoch & Coggeshall, 20 (Mal)

- Kutschera Aschberger, H 394 (Mal)
 Kurell W C Layton, W B Frick, W D &
 Cutting, W C 318 (Am)
 Kyeer F A with Hartman, 22 (Am)
 — with — & Comfort, 621 (Am)

L

- Lacaz, C de S 418 (Misc)
 Laffer N C 103 (Der)
 Lagne W 412 (Misc)
 Laha, P N with Choudhary L M 672 (Hel)
 Lahm, M N 346 (Lept)
 — with Pancha & deMonte 162 (Chl)
 Lai, D G with Politzer Yao & Chen 159 (Chl)
 Laird R L 523 (Mal)
 — with Roseboom, 664 (Mal)
 — with — & Fox 430 (Mal)
 Lal, R B & Das Gupta A C 713 (Sp)
 — Agarwala S P & Adak, B 340 (Diet)
 — Makhber, S P & — 340 (Diet)
 — with Mukherji & Mathar 339 (Diet)
 — Raja, K C K E & Satya Swaroop 157 (Chl)
 — — & Basak, J. C 157 (Chl)
 — with Satya Swaroop, Raja & Basak, 157 (Chl)
 Lal, T N with Still, 303 (Mal)
 Lampert, 824 (Typh)
 Lancet, 183 (Hel) 319 (Dys) 365 369 (633) (Typh)
 Lander J 48 (Misc)
 Lase C 777 (Hel)
 Leppang, D 553 (Dys)
 Lara C B with Nolasco 223 (Lep)
 Larenaas, R with Beltran 309 (Mal) 619 (Am)
 Larrimore G W with Horne 456 (Misc)
 Larsen R M with Kampenier 721 (Misc)
 Lawler H J 633 (Hel)
 Lawa, C L 333 (Dys)
 Layton W B with Kurell, Frick & Cutting 318 (Am)
 Lazarevi, V 672 (Hel)
 Lameris J with Trebes, 498 (Hel)
 Leach, C M with Johnson 591 (Rab)
 League of Nations, 72 (A F)
 Leblond, C P & Chauvin-Serviers J 573 (Diet)
 Lee D B 397 (Mal)
 Lee O S Jr & Lam F K, 402 (Oph)
 — Rottenstein H S & Chao H Y 402 (Oph)
 Lee, R S H 317 (Am)
 Leeson, H S 316 (Mal)
 Lehrfeld, L & Brensacher C F 477 (Hel)
 Leichensin J M Donohoo E G & Wall, L M 480 (Haem)
 Leiper, R T 566 (Hel)
 Lepert, T & Loucoupos, L 743 (Tryp)
 Leoa, F with Unanue, 14 (Hel)
 Leon, L A (111) (Der)
 — with Marzotti, 671 (Tryp)
 de Leon, W with Dima & Galvez, 466 (Hel)
 León y Blanco F 110 111 113 (Der)

- Leonida, J, 880 (Diet)
 Lepore, M J & Golden, R., 337 (Pel)
 Leprosy in India, 831 (Lep.)
 Lerder J with Alessandri & Garcia Pala nciou, 710 (Diet)
 — with Garcia Palarecos, 556 (Am)
 Le Van, J H 78, 77 (Y F)
 Levin, A J 183 (Hel)
 Levin, O L & Behrman H T 114 (Der.)
 Lewis, D J with Findlay & Kirk, 457 (A F)
 — Hughes, T P & Mahaffy A F 635 (A F)
 Lewis, E. A., 633 (Misc)
 Lewis, E G with Foy 236 (H)
 Lewis, R R 648 (Misc)
 Lewis Medical & Scientific Library 769 (B R)
 Lewthwaite, R., with Saroor 345 (R B F)
 Leyva, J P with Smith & Calderon-Cervio 77 (Y F)
 Liebow, G 783 (Typh)
 Lee Kian Joe with Bonine, Bonitlap, Molekulamp de Moor & Manning, 629 (Hel)
 — with — — & Manning, 623 (Hel)
 — with — Molekulamp & Mreyen, 184 (Hel)
 Lubbe R D 149 548 (Typh)
 — with Roe & Wilcox, 484 (Misc)
 Luma, A O 500 (Hel)
 de Luna, P with Amaral, 463 (Hel)
 Luo H L 33 (Am)
 — & Wong, Y R 476 (Hel)
 Lue, S Chang, Y & Ch'uan, T., 318 (Am)
 — — & Tan, S 179 (Mal)
 Lu W & Xia, S H 143 144 (Typh)
 — Chung, H. L. & Wang, C W., 613 (Typh)
 Lyon J with Selden, Howtess & Gauran 698 (Oph)
 Lobo, M M 292 (Mal)
 — & Schott, L M 303 (Pl)
 Lo Ping Kian, 183 (Misc)
 Loh, G L with MacGregor 63 84 202 (Misc)
 Lopatin, G M 518 (Mal)
 Lorenze E J with Kerley 633 (Diet)
 Loucoupos, L with Lepert, 743 (Tryp)
 Low J H 483 (Misc)
 Low G C 777 (Hel)
 Low J 461 697 (Lep)
 — & Dhanasekara, 227 (Lep)
 — with Dhanasekara, 606 636 637 (Lep)
 — & Sen, N R 857 (Lep)
 Lorenzo A A with Gutierrez, Navarro Morales & Gomez, 460 (A & S)
 Lu C 627 (Hel)
 Lu, J P with Chung, 108 (Lamb)
 Lucena D with Pinao, 473 (Hel)
 Lucres G with Pinao, 516 (Mal)
 Lui Kwai To, 274 (H)
 Lum, F K., with Lee, 402 (Oph)
 Lumsden W H R with Seaton, 490 (Misc)
 Lunala Health Department, 69 (Misc)
 v Lutterotti, M 675 (Misc)
 Lux K 842 (Typh)
 Lusk, I L 603 (Mal)
 Lyford H S 55 (Misc)
 Lyon, G M 692 (Dys)

M.

- Macan T T 810 (Mal.)
 MacCallum, F O with Findlay & Kirke 455 (Y.F.)
 Macchivello A. 308 (Pl.) 495 (Misc.)
 — Cifuentes, O & Ovale H 574 (Fev.)
 McClelland, H W H 167 (Leish.)
 McCormack, J D, 138 (Typh.)
 McCoy O R. with Offutt, 635 (Hel.)
 McDermott, E B with Kahn & Marcus 42 (Y & S)
 McGrath J with O'Donovan & Boland, 692 (Dys.)
 MacGregor R. G S & Loh G L. 53 54 202 (Misc.)
 Macbella, T., 573 (Diet.)
 McKean, J H 231 bis (Lep.)
 McKelvie A R Kirk, R & Holder H J 401 (Oph.)
 McKenna & Platts S A 328 (Diet.)
 Mackenzie K G F with Hargreaves 409 (Vms.)
 Mackenzie M D 370 (Typh.)
 Mackie F P 65 549 (Y.F.)
 McMahon J C. 396 (Mal.)
 McMahon, J with Symes & Haddow 577 (Misc.)
 McMullen S I 411 (Misc.)
 McMullen D B & Brackett S 567 (Hel.)
 McNaught J B Beard R. R. & Myers J D 194 (Hel.)
 Macpherson, R. K. 577 (Misc.)
 Macumber H H 690 (Dys.)
 Magalhães, A. & Coelho B 10 (Hel.)
 do Magalhães, O 151 152 828 (Typh.)
 — & Guimarães R 409 (Vms.)
 — & Moreira J A. 545 (Typh.)
 — & Rocha A. 452 (Typh.)
 Magath T B with Berkman, 842 (Am.)
 — with Wyrens & Tillsch 194 (Hel.)
 Magerl, J F 154 (Fev.)
 Mahadevan, R. 186 (Hel.)
 Mahaffy A. F Hughes T P Smithburn K. C. & Kirk R 456 (Y.F.)
 — with Lewis & Hughes, 685 (Y.F.)
 — Smithburn K. C. Jacobs, H R. & Gillett, J D 759 (Y.F.)
 Maher H. C. with Watson 281 (Mal.)
 Maier J & Coggeshall L. T 397 (Mal.)
 — with — & Best, 395 (Mal.)
 Maityan L. M., 516 (Mal.)
 Majumdar D N with Napier & Das Gupta 100 (Hel.)
 Malbrant, R. 242 (Tryp.)
 Mahk, K. S. with Panja Paul & Ghosh 839 (Chl.)
 — with Paricha & Paul 166 (Chl.)
 Maltaner E., 41 (Y & S)
 Manfredonia, M 601 (Mal.)
 Mangalamaya, M. with Daengsvang, 564 (Hel.)
 Manrique J B & Montoya, J A. 815 (Typh.)
 Manson Bahr C. 348 (Misc.)
 Manson-Bahr P H 6 777 (Hel.) 29 (Am.) 33 (Dys.)
 Manwell, R. D with Coulston, 440 (Mal.)
 Maplestone P A. 16 (Mal.) 775 (Hel.)
 — & Bhaduri, N V., 782 (Hel.)
 Maplestone P A. with Dey 103 (Der.)
 Marchoux, E. Chorine V Chabaud A & Tisseul J 854 (Lep.)
 Marcus S with Kahn & McDermott 42 (Y & S)
 Marschal P with Sparrow 543 (Typh.)
 Marks M B 252 (Mal.)
 Marra, J A with Talico & Costa 536 (Tryp.)
 Marshall, F 456 (Y.F.)
 Marshall J P 794 (Misc.)
 Martin G J Thompson M R & Acousti N J 464 (Hel.)
 Martindale, 59 (B.R.)
 Martinez L E with Groot & Mayoral 140 678 (Typh.) (548) 683 bis (Fev.)
 Martinez Niochet A & Pons, A R. 607 (Leish.)
 Martins A F 608 (Leish.)
 Martins M L. (397) (Mal.)
 Mason, H L & Williams, R. D (333) (Bb.)
 Mason J H with Neitz & Alexander 757 (Typh.)
 Massias C 531 (Bl.)
 Mathur K B L. with Mukjerji & Lal 339 (Diet.)
 Matthews C B with Boyd & Kitchen 431 (Mal.)
 Maus E A (196) 572 (Hel.)
 Mayer M 239 (Tryp.)
 Mayoral P 791 (Misc.)
 — with Garcia Caballero 682 (Fev.)
 — with — & — 140 678 (Typh.) (548) 683 bis (Fev.)
 Mays J R S with Burney & Iskrant 665 (Mal.)
 — with Eagle Hogan & Burney 119 (Mal.)
 Mazza, S (249) 536 820 (Tryp.)
 — Basso G & Basso R. 249 446 (Tryp.)
 — Freire, R. S & Salica, P N 671 (Tryp.)
 — & Jorg, M E. (537) (Tryp.)
 — & Salica, P R. 248 (Tryp.)
 Mazzotti L., 247 (Tryp.)
 — & Leon L A. 671 (Tryp.)
 — & Osorio M T 704 (Hel.)
 Meade J A. & Barnett, L 470 (Hel.)
 Mededeelingen van den Dienst der Volksgezondheid in Nederlandsch Indië 532 (Pl.)
 Medical Journal of Australia 459 (Chl.) 487 (Misc.)
 Medical Research Council, 821 (Typh.)
 Med. Welt, 385 (Typh.)
 van Macrendonk, 679 (Typh.)
 de Mettlen B. with Gear 152 (Typh.)
 — & Pereira, M. de C 294 (Mal.)
 — & Robello A. 350 (Misc.)
 Meira, J A. 9 (Hel.)
 Megaw W D with Rogers, 282 (B.R.)
 Meléndez A F with Carr & Meléndez, J F., 513 (Mal.)
 — with — — & Ros 516 (Mal.)
 Meléndez J F with Carr 514 (Mal.)
 — with — & Meléndez, A F., 513 (Mal.)
 — with — — Ros & Meléndez 515 (Mal.)
 Meisner H. E. 484 (Der.) 554 (Am.)
 Méndez M. & Huaman, N 432 (Mal.)
 Méndez, González, E. 711 (Diet.)

- Meng, C & Winfield, G F 650 (Misc)
 Menk, W 452 (Typh)
 Menon, K. P with Seetharama Iyer & Shortt, 574 (Mal)
 — with Shortt & Seetharama Iyer 670 (Mal)
 Menon, M K with Russell, 806 (Mal)
 Menon, T B 186 (Hel)
 — & Ramamurti, B 477 (Hel)
 — with Rao, 199 (Misc)
 Mentzer, R L Daugh F C & Connell W A 491 (Misc)
 Menna, P & Toomanoff C 180 (Mal)
 Menzies, T 63 (V F)
 Mettner, V M 403 (Oph)
 Merlegracht E & Bachel J 336 (Pol)
 — with — 337 (Pol)
 Meyer K F 648 634 (Pl)
 Meyers, F M 330 (Br)
 Meythaler F 808 (Mal)
 Michigan Public Health 568 (Hel)
 Miller J E 12 (Hel)
 Miller M J & Allen D 781 (Hel)
 Mills C A 497 (Misc)
 Millspaugh, J A & Sompayrac L M 774 (Hel)
 Ministry of Agriculture and Fisheries, 308 (Pl)
 Ministry of Shipping, 176 & (Mal)
 Minnich, V Wright, S T Moore, C V & Spies, T D 335 (Pol)
 Mira, A. K., 437 (Mal)
 Mishra, A 123 (Mal)
 Mitchell, J F with Field & Vries, 179 182 (Mal)
 Mochtar A de Reede C A & Rijkbeësch 347 (Lept)
 Mohan, B V with Mulligan & Russell 309 (Mal)
 — with Russell 117 391 (Mal)
 — with — & Mallagan 300 (Mal)
 Mohr W 644 (Am) 656 (558) (Hel)
 Moser B 608 (Lept)
 Molenkamp, W J J with Bonne Borstlap Lee Kian Joe de Moor & Nanning 629 (Hel)
 — with — — & Nanning, 629 (Hel)
 — with — — — & Mryen, 184 (Hel)
 Moll, A A & O'Leary S B 303 637 (Pl)
 Molaret P 21 (Mal)
 Mooney, T D F (333) (Lept)
 Monthly Bulletin, Manila, 406 (Hel)
 Montoya, J A with Manrique 613 (Typh)
 de Moor C E with Bonne, Borstlap Lee Kian Joe Molenkamp & Nanning 629 (Hel)
 Moore C V with Minnich, Wright & Spies, 335 (Pol)
 Moore L T with Henderson & Pinkerton, 645 (Der)
 Moore, R A, Spies, T D & Cooper, Z K., 680 (Der)
 Moore, S. W., 591 (Rab)
 Moorthy V N (632) 633, (780) (Hel)
 Morales, E. G with Doull, Rivera, Saunders & Guinto *19 (Lept)
 Morales, F H with Suarez, 322 (Dys)
- Morales, S. B with Gutierrez, Navarro Lorenzo & Gomez, 460 (L & S)
 Morera, J A., with de Nagalakes, 845 (Typh)
 Morel, C J L (706) (Hel)
 Morrison, D R & Anderson, W A D 604 741 (Mal)
 — with — 741 (Mal)
 — with — & Williams, 811 (Mal)
 Motta, O C., 644 (Der)
 Moondjais A with Foy & Kenda, 268 (Br)
 Mowat A H & Hennessey R S F 41 (Misc)
 Mouley A 11 (Hel)
 Mryen, F W 490 (Misc)
 — with Bonne, Lee Kian Joe & Molenkamp 184 (Hel)
 Mrugowsky J 341 (Fer) 800 (Misc)
 Mrowka L., with Kubath, 24 399 (Mal)
 Mueller J P & Combs, P 89 (Hel)
 Muhlen, P 823 (Typh)
 Muir E 832 (Lept)
 Muir R 283 (B R)
 Mukerjee S with Ghosh, 690 (Chl)
 Mukherji, S P with Lal, Das Gupta & Ad 540 (Der)
 — & Mathur h B L 338 (Der)
 Mukerjee, S with Ray & Roy 741 (Mal)
 Mulhgan H W Russell, P F & Mol B V 300 (Mal)
 — with — & — 300 (Mal)
 Mundt, L K with Wile 433 (Mal)
 Munk, F (142) 369 (Typh)
 Muraz, G 744 (Typh)
 Murray A J & Crocket, J A 500 (Res)
 Muto S (6) (Hel)
 Mwan E M K & Trowell, H C Hennessey R S F 695 (Misc)
 Myers J D with McNaught & Bear (Hel)
 Myers P B & Rouse A H 37 (Dys)

N.

- Naganna B with Giri, (335) (Pol)
 Nade, V R with Heitz, 375 827 (I)
 Nagera Angelo L 350 (Misc) 460 (I)
 Nakasato, T with Yomo, 183 (Hel)
 Nanning W with Bonne, Borstlap Lee Kian Joe & Molenkamp, 628 (Hel)
 — with — — — & — 629 (Hel)
 Napier L C & Chandrahri, R. N 1
 — Das Gupta, C R. & Majumdar 100 (Hel)
 — & Edwards, M I N 785 (Ha)
 — & Gupta, P C S 748 (Leish)
 — Kirwan, E. O. G. & Sen, G I.
 — Neal-Edwards M I & Das G 481 (Haem)
 Nargund, K. S with Boid, (688)
 — with Pandya & Boid, (606)
 Nash, T A M 234 41 832 (Try)
 Nasr M 776 (Hel)
 Natal, R with Barnett & Calnod, 387 (Typh) 833 (I)
 — & Weyer F., 368, 283 (Typh)
 — & Zamp, F 368 (Typh)

Navajas, E. with Cardosa 248 (Tryp.)
 Navarro R. J. with Gutierrez, Morales
 Lozano & Gomez 400 (Y & S.)
 Neal Edwards M. L. with Napier & Das
 Gupta, 481 (Haem.)
 Neghme A. & Fauguenbaum J. 246 (Tryp.)
 — with Noé 427 (Mal.)
 de Negri, U. 262, 520 (Mal.)
 Neitz W. O. Alexander R. A. & Mason
 J. H. 737 (Typh.)
 Neva, C. & Arantes J. B. 406 *ter* (Vms.)
 — with — 405 641 *bis* (Vms.)
 Nettel R. 572 (Hel.)
 Ngu D. with Galliard, (16) (Hel.)
 Nicholls L. 338 (Pel.)
 Nicol L. with Deschamps, (102) (Hel.)
 — with Ramon, Boquet & Richou 886
 (Vms.)
 Nicol, W. D. & Shute P. G. 739 (Mal.)
 Nigeria 442 (Tryp.)
 Niño F. L. 107 (Der.) (350) (Misc.)
 Niven, J. C. 258 (Mal.)
 — with Field & Mitchell 179 182 (Mal.)
 Noé J. & Neghme A. 427 (Mal.)
 Nolasco J. O. & Lara, C. B. 222 (Lep.)
 Noronha A. J. 18 (Mal.)
 Nunemaker J. C. with Brown, 603 (R F.)

O

Oafia, T. with Scolari, 565 (Hel.)
 Ochamer A. & DeBailey M. 840 (Am.)
 O'Donovan, D. K. McGrath, J. & Boland
 S. J. 692 (Dys.)
 Oelkers, H. A. & Rathje W. 767 (Hel.)
 — & Zessler H. 709 (Hel.)
 Oesterlin, M. 299 (Mal.)
 Oettel, H. & Thaddeus, S. 638 (Sp.)
 Offutt, E. P. Jr. & McCoy O. R. 635 (Hel.)
 Ohama, S. 97 183 *bis* (Hel.)
 O'Leary S. B. with Moll 303 687 (Pl.)
 Oliver-Gonzalez, J. (627) (Hel.)
 Ollerios A. R. 480 (Sp.)
 Olmos Castro N. with Fernandez, 227 (Lep.)
 Omori, N. 85 (Misc.)
 Oommen, A. V. with Viswanathan & Das, 598
 (Mal.)
 Oomen, H. A. P. C., 39 (Y & S.)
 Ordman, D. 343 (R. F.)
 Orusa, 158 (Chl.) 216 (Lep.)
 Oriana, M. M. 519 (Mal.)
 Ortiz A. A. 465 (Hel.)
 Ortiz J. with Stokes, 618 (Am.)
 Osburn, H. S. 313 618 (Am.)
 Osorio M. T. with Mazzotti, 704 (Hel.)
 Otálora, B. 820 (Tryp.)
 Otten, L. 309 (Pl.) (484) (791) (Misc.)
 Otten-van Stockum, M. J. 592 (Rab.)
 Otto G. F. with Brown, 89 (Hel.)
 Otto R. & Backhardt R., 538 (Typh.)
 Ou, T. 118 (Mal.)
 Ovalle H. with Macchivello & Cifuentes,
 374 (Typh.)
 Ovaros J. C. with Peña Chavarria, 644 (Der.)
 Owczarowicz, L. 751 (Typh.)

P

Pacheco Marroquin, S. 882 (Sp.)
 Paddock A. 462, (857) (Lep.)
 Palestine 592 (Mal.)
 Palmer E. D. 89 (Hel.)
 Panama Canal (575) (Misc.)
 Pande P. G. 537 (Leish.)
 Pandit, S. R. with Read 159 (Chl.)
 — with — & Das, 838 (Chl.)
 Pandya B. C. Nargund, R. S. & Bokil K. V.
 (998) (Lep.)
 Panja G. Malik, K. S. Paul, B. M. & Ghosh
 S. K. 839 (Chl.)
 Panther R. with Giroud 733 (Typh.)
 Para M. with Villela, 645 (Der.)
 Pardi, E. 762 (Pl.)
 Pardo-Castello V. & Ferrer I. 789 (Der.)
 Parise N. 22 (Mal.)
 — & Lucreti, G. 516 (Mal.)
 Parker W. V. with Knowles & Johnson 123
 (Mal.)
 Parpacón J. V. (8) (Hel.)
 Pascale H. with Pessoa, 473 *quin* (476)
 (Hel.)
 Pauricha, C. L. & Abedin, Z. 407 (Vms.)
 — — & Paul, B. M. 166 (Chl.)
 — Lahuri, M. N. & deMonte, A. J. H. 162
 (Chl.)
 — Malik, K. S. & Paul, B. M. 166 (Chl.)
 — & Paul, B. M. 162 (Chl.)
 Paterno P. (254) (Mal.)
 Pathan, H. A. H. 896 (Oph.)
 Patuño-Camargo L. 378 542 (Typh.)
 Patrick, D. W. & Wolfe D. M. 228 (Lep.)
 Pattnayak, C. C. 177 (Mal.)
 Paul B. M. with Panja, Malik & Ghosh 839
 (Chl.)
 — with Pauricha 162 (Chl.)
 — with — & Abedin, 166 (Chl.)
 — with — & Malik, 166 (Chl.)
 de Paula, H. V. & Frota, P. 315 (Am.)
 Pálvel M. 574 (Diet.)
 Pecache, L. V. with Straneky 411 (Misc.)
 Pechtel, C. 386 (Fev.)
 Peltier M. Dureux, C. Jonchère H. &
 Arqués E. 761 (Y P.)
 Peña Chavarria, A. & Ovaros J. C. 644 (Der.)
 Peña Yañez A. 386 (Fev.)
 Penfound, W. T. 740 (Mal.)
 Penner L. R. 769 (Hel.)
 Peregrino E. P. with Gordon & Davey 515
 (Mal.)
 Pereira M. de C. with de Meillon, 294 (Mal.)
 Pereira O. de L. 689 (Lep.)
 Peretti A. with Vaccaro 752 (Typh.)
 van Pernis, P. A. Benson, M. E. & Holinger
 P. H. 109 (Der.)
 Perrin, T. L. & Bengtson, I. A. 830 (Typh.)
 Perry W. B. with Fellows 387 (Mal.)
 Pesce H. (218) 623 (Lep.)
 Pesani, S. B. with Stovall 590 (Rab.)
 Pessoa, S. B. 175 673 (Leish.)
 — & Coutinho J. O. 175 610 (Leish.)
 — & Lucena, D. 473 (Hel.)
 — & Pascale, H. 473 *quin* (476) (Hel.)
 — & Pestana B. R. 609 610 673 674
 (Leish.)
 — with Villela & Pestana 610 (Leish.)

- Pestana, B R with Pseudo, 609 610 673, 674 (Lush)
 — with Villola & Pseudo, 616 (Lush)
 Pettit, V D with Diggs, 716 (Haem)
 Pick, F 314 (Am)
 Piermaria, G 99 (Hel)
 Pifano, P 243 247 (Tryp)
 Pinney A 727 (B R)
 Pinkerton, H with Henderson & Moore 643 (Der)
 Pirou, J H H & Grasset, E 311 (Pl)
 Platts, S A with McKenzie 326 (Diet)
 Plotz, H & Reagan, R 586 (Hab)
 — & Wertman, K 660 (Typh)
 Plou, D 637 (Pl)
 Polhitzer R Yau H Y Lai D G & Chen, S K 159 (Chl)
 Ponce, A R with Martinez Niochet, 607 (Lush)
 Portoondo Barcelo J M (79) (V F)
 Power F M Jr with Calmore & Kean, 796 (Misc)
 Pot A W van Raalte H G S & ander Sar, A 532 (Dys)
 Potenza, L 594 (Mal)
 Prampolini, N 438 (Mal)
 Prasad K 349 (Misc)
 Price C H G 530 (Pl)
 Priest, R 738 (Mal)
 Prohl, K J 41 (V & S)
 Provost, A with Roubaud, 234 (Tryp)
 Prusa, G W A 52 (Misc)
 Prays, W M 316 (Am)
 Praybykiewicz, Z with Eyer & Dullenberg 365 (Typh)
 Public Health Reports, 113 (Mal) 303 762 763 (Pl) (350) (Misc) 611 (Typh)
 Publication of the American Association for the Advancement of Science N 15 483 (Misc)
 Purcell, F M 763 (Diet)

Q

- Quattrin, V 392 (Mal)
 Querrido A 403 (Oph)

R

- van Raalte H G S with Pot & van der Sar 552 (Dys)
 Racine W 767 (Lep)
 Raevski, 253 (Mal)
 — with Kalabukhov 307 (Pl)
 Raffaele G 263 (Mal)
 Rai, S 217 (Lep)
 Raja, K C K E with Lal & Satya Swaroop 157 (Chl)
 — with — — & Basak, 157 (Chl)
 — with Satya Swaroop, Lal & Basak, 157 (Chl)
 Rail, Y M 307 (Pl)
 — Florentova, A A & Sheikh, M V 307 (Pl)
 Ram, L M 736 (Mal)
 — with Himm, 296 (Mal)
 Rameshchandra Rao with Russell, 599 (Mal)

- Ramakrishnam, C S with Venkatraman, 438 (Chl)
 — with — & Krishnaswami, 160 (Chl)
 Ramamurti, B 186 (Hel)
 — with Mason, 477 (Hel)
 Raman, T H & Abba, C, 403 (Oph)
 Ramaswami, M V, 186 (Hel)
 Ramirez, E & Rivero, M D 112 (Der)
 Ramon, G Boquet, P Richow R & Nicol, L 886 (Vms)
 Ramon, T K 251 (Mal)
 Ramon A da S with Correa, 737 (Mal)
 — & Urti, O 287 (516) (Mal)
 Rand, C G, 549 (V F)
 Rao, B T & Mieson, T B 189 (Misc)
 Rao, M V R 578 (Diet)
 — with Bopuaya, 665 (Misc)
 Rao, P H 415 (Misc)
 Rao S S & Sakhatme, P V, 183 (Hel)
 Rao, T R with Russell 427 (Mal)
 Rao V V 236 (Mal)
 Rao, W V S K 189 (Hel)
 Rathye, W with Oelkers, 767 (Hel)
 Raenel, B O with Beach, 649 (Misc)
 Ray, J C Makeryee S & Roy A N 741 (Mal)
 Ray M with Hegner West & Dobler 174 (Mal)
 Ray P V 186 189 (Hel)
 Raymond, L D 327 (Diet)
 Raymond W D 323 (Diet)
 Read, M 723 (Misc)
 Read W D B & Pandit, S R 159 (Chl)
 — & Das P C 639 (Chl)
 Reagan R with Plotz, 666 (Hab)
 Reardon L V with Chinn, Jacobs & Rees, 765 (Am)
 — with Cram & Jones, 191 (Hel)
 — with Rees & Jacobs (49*) (Misc)
 — with — — & Jones, 28 (Am)
 Reay E R 470 (Hel)
 Rebbo, A with de Meillon, 350 (Misc)
 Reed, A C 767 (Misc)
 de Reede C A with Mochtar & Rykobaach 347 (Lept)
 Rees, C W with Chinn, Jacobs & Reardon, 765 (Am)
 — Reardon, L V Jacobs, L & Jones, F 28 (Am)
 — with — — & — (49*) (Misc)
 Reschenow E 233 (Tryp)
 Reichs-Gesundheitsblatt, 628 (Typh)
 Reid, J A with Tweedie & Hodgkin, 522 (Mal)
 Reid, J D with Shaw 104 (Der)
 Rajadurjo 437 (Mal)
 Remandet, R with Deschamps (63) (Hel)
 Remant, L & Verma, V 5 (Hel)
 Revengo, A J 318 (Lep)
 Revista de Combate a Lepra, 206 (B R)
 Rey Matur, H, 174 (Lush) (247) (Tryp)
 Royce, V & Richard, J 377 (Typh)
 Ribero, E B with Campos, 222 (Lep)
 Ricciardi, B with Torreale, 248 (Tryp)
 Rice M E with Watson, 436 (Mal)
 Richard, J with Royce, 377 (Typh)
 Richardson, D T, 65 (V F)
 Richow, R with Ramon, Boquet & Nicol, 886 (Vms)

- Riddle J W Spies, T D & Hudson, N P 339 (Fel.)
 Rijckelshuis with Mochtar & de Roede 347 (Lep.)
 Rimington, C 529 (Bl.)
 Rin, S 298 (Mal.)
 Riou M. 50 413 (Misc.)
 Risquez J R. & Bora, F V 560 (Hel.)
 Ristorelli A. & Dao Van Ty (833) (Fev.)
 Rivas C. I. & Góbbel E. (706) (Hel.)
 Rivera, E. M. with Doull, Saunders Guinto & Morales 219 (Lep.)
 Rivero M. D. with Ramirez, 112 (Der.)
 Ro M. & Yokogawa, S 13 (Hel.)
 Robertson, R. C. 11 (Hel.) 849 (Misc.)
 — Bard S & Chan J. (334) (Bb.)
 — & Chang, T L. (177) (Mal.)
 Robinson, G G 692, 847 (R.F.)
 — with Cole & Cosgrove 748 (Leish.)
 Robinson P. 279 (Misc.) 848 (R.F.)
 Robson, J M & Scott, G I 402 (Oph.)
 Rocha, A. with Magalhães, 452 (Typh.)
 Rockefeller Foundation 64 615 (Y.F.) 140 (Typh.)
 Rodriguez, J N. with Guinto 216 217 (Lep.)
 Rodriguez Molina, R. 638 (Sp.)
 Rodriguez Ollerena A. 715 (Sp.)
 Roe M. A. Wilcox, A. & Lillie R. D. 484 (Misc.)
 Rogers, L. (22) (Mal.)
 — & Megaw J W D. 282 (B.R.)
 Rogliano A G. 694 (R.F.)
 Roig y Raventós, J. 608 (Leish.)
 Romaña, C. 292 (Mal.)
 Romero Escacena G. 139 (Typh.)
 — Bohinches, J. & Alvarez, M. 540 (Typh.)
 van Rooyen, C. A. 17 (Mal.)
 Röpke F. 722 (Misc.)
 Ros A. with Carr Meléndez A F & Meléndez, J F. 515 (Mal.)
 Rose, 372 (Fev.) 396 (Mal.)
 Rose H M. with Culbertson, 95 (Hel.)
 Rosenfeld, G. & Cardoso F A. 247 (Tryp.)
 Rosenfeld S. & Rubinstein J. 405 (Vms.)
 Rosenthal L. H. with Woodman 106 (Der.)
 Rosinger Z., 738 (Mal.)
 Ross, G R. & Aylen D. 260 (Mal.)
 Rossas T P. 218 (Lep.)
 Rosiyaky F. 142 (Typh.)
 Rottenstein, H S. with Lee & Chao 402 (Oph.)
 Rouband, E. & Provost, A. 234 (Tryp.)
 Rouse A. H. with Myers, 37 (Dys.)
 Roussel H. with Estabritte 888 (Oph.)
 Roy A N. with Ray & Mukerjee 741 (Mal.)
 Roy B. with Ghosh 341 (Diet.)
 Roy B. C. 531 (Bl.)
 Roy D N. with Chopra & Ghosh, 290 (Mal.)
 — & Ghosh, S M. 900 (Misc.)
 — — & Chopra, R. N. 795 (Misc.)
 — & Roy P C. 437 (Mal.)
 — with Strickland, 578 (Misc.)
 Roy P C. with Roy 437 (Mal.)
 Roy R., with Barma & Bhattacharya, (620) (Am.)
 Roseboom L. E. 74 (Y.F.) 811 (Mal.)
 — Fox L. A. & Laird, R L. 430 (Mal.)
 — & Gahldon, A. (431) (Mal.)
 Roseboom L. E. & Laird R. L. 684 (Mal.)
 Ruangsiri, C. with Cowdry 233 (Lep.)
 Rubinstein J. with Rosenfeld 405 (Vms.)
 Ruchell, A. P. (672) (Tryp.)
 Rudolf, E. 228 (Lep.)
 Ruffin, J N. with Schulze 839 (Am.)
 Ruiz, H. with Kumm 290 (Mal.)
 — with — & Vollo 291 (Mal.)
 Ruiz Nazario R. with Carrión & Hernandez Morales 110 (Der.)
 Runacher A. with Anderson Berge & Fauconnier 342 (R.F.)
 Runner A. G. 307 (Pl.)
 Russell B. A. S. 482 (Haem.)
 Russell, H. 165 (Chl.)
 Russell P F. 435 603 (Mal.)
 — & Knipe F W. 667 (Mal.)
 — & Menon, M K. 803 (Mal.)
 — & Mohan B N. 117 301 (Mal.)
 — Mulligan, H. W. & Mohan B N., 300 (Mal.)
 — with Mulligan & Mohan 300 (Mal.)
 — & Ramachandra Rao T. 598 599 (Mal.)
 — & Rao T R. 427 (Mal.)
 Rustonjee K. J. with Sivalingham, 683 (Mal.)
 Rutter A G. (39) (Y & S)
- 8.
- Sablin P E. & Egorova O G. 519 (Mal.)
 Sager F. with Dostrovsky 749 (Leish.)
 Saidun de Rodriguez M. L. Soto J A. & Giampietro J. 704 (Hel.)
 Salgar A A. (706) (Hel.)
 Saliba, P N. with Marra & Freire 671 (Tryp.)
 — P R. with Marra, 248 (Tryp.)
 Salis, H. 28 (Am.)
 Salt, G. (351) (Misc.)
 Sanders J P. 813 (Mal.)
 Sanders, J D. 316 (Am.)
 Sandground, J H., 7 (Hel.)
 Sauer R. G. with Gear & Harris, 830 (Typh.)
 Sanyal, S N. (159) (Chl.)
 Sapero J J. 472 (Hel.)
 de Saram, G S W. & Gunewardene, S R. 570 (Hel.)
 Sarkar S K. 297 (Mal.)
 Sarkar S N., 711 bis 712 (Diet.)
 Sati M. H. 747 (Leish.)
 Satya Swaroop with Lal & Raja, 157 (Chl.)
 — with — & Basak, 157 (Chl.)
 — Raja, K. C. K. E. Lal, R. B. & Basak, H. C. 157 (Chl.)
 Saunders, G. 834 (Tryp.)
 Saunders, G F T. 532 (Tryp.)
 Saunders, G M. 182 (Hel.)
 — & Bancroft, H., 896 (Misc.)
 — with Doull, Rivera, Guinto & Morales 219 (Lep.)
 Savor S R. & Lowthwaite R. 345 (R.B.F.)
 Sawitz, W. 771 (Hel.)
 — & Faust, E. C., 785 (Am.)
 Sawyer W A., 683 (Y.F.)
 Schaeffer C. O. 197 (Misc.)
 Scharff, J W. & Tweedie M. W. F., 814 (Mal.)

- Schenone B H. with Grana, 703 (Hel)
 Schlegel, B. 331 (Misc)
 Schlescher L M 786 (Haem)
 Schmidt, G. 280 (Misc)
 Schmidt, H. Christian T T & Smotherman
 W M 465 (Hel)
 — with Kikuth, 450 (Lesh)
 Schneider O 488 (Misc)
 Schmitzer R. J. Siebenmann, C & Bett
 H D 862 (Hel)
 Schröflner W 431 (Mal) 847 (Lept)
 Schryman, S. 225 (Lept)
 Schlemann, W. 743 (Mal)
 — & Knoche E. 53 (Mal)
 Schulz W & Ruffin J. 839 (Am)
 Schumacher W. with Sock 776 (Hel)
 Schwartz, L. Ernst W & Flippin, H. F.
 601 (Mal)
 Schwarz, J. & Straub M. (709) (Hel)
 Seclari, P. G. & Ocaña T. 565 (Hel)
 Scott G. I. with Robson 402 (Oph)
 Scott, H. H. 798 (B R)
 Scott, J. A. 863 (Hel)
 Scott, R. R. (835) (Misc)
 Seaton, D. R. & Lumsden, W. H. R. 490
 (Misc)
 Seck, P. & Schumacher W. 776 (Hel)
 Seclan, J. Koutseff A. Livon, J. & Gauran
 M. 808 (Oph)
 Seetharama Iyer P. V. Shortt, H. E. &
 Menon, K. P. 824 (Mal)
 — with — & — 670 (Mal)
 Segal, L. J. 508 (Hel)
 Seguy E. (794) (Misc)
 Seiffert, G. 611 (Typh)
 Sellards A. W. 78 (Y F)
 Sellers T. F. with Damon, 590 (Rab)
 Sen, B. with Chopra & Gupta 255 (Mal)
 Sen, G. with Naper & Kirwan, 171 (Lesh)
 Sen A. R. with Lowe & Dharmendra, 557
 (Lept)
 Sen P. 294 664 810 (Mal)
 Senjyu, H. A. 83 (Hel) 174 (Lesh)
 — & Zeboun, M. 187 (Lesh)
 Sen Gupta, P. C. with Grevil & Das, 225
 (Lept)
 Serra, J. da M. 606 (Hel)
 Sequera, J. H. & Dowdswell R. M. 798
 (Misc)
 Seurat, L. G. (604) (Mal)
 Shah, M. H. 173 (Lesh)
 Shaw F. W. & Reid J. D. 104 (Der)
 Shaw G. W. B. & Clyde A. J. 14 (Hel)
 Sheldona, M. V. with F. yurk 308 (Pl)
 — with Rall & Flegostova, 307 (Pl)
 Sheldon, A. J. with Brown 190 (Hel)
 Shelton, C. F. 76 (Y F)
 Shikong, 83 (Rab) 181 (Chl)
 Shimura, S. with Ishii & Tsuda 129 (R F)
 Shortt, H. E. Menon K. P. & Seetharama
 Iyer P. V. 670 (Mal)
 — with Seetharama Iyer & Menon, 824
 (Mal)
 Shiergold, E. with Khodukua, 116 (Mal)
 Shute, P. G. with Nicol, 739 (Mal)
 Sicari, S. with d'Aleandro, 256 (Mal)
 Secret, M. (519) (Mal)
 Siebenmann, C., with Schmitzer & Bett, 862
 (Hel)
 Siegenbeek van Heekalorn, A. & Wahab, 257
 (Mal)
 Schiao Ambia, L. 620 (Am)
 Silva, F., 114 (Der)
 de Silva, K. J. L., 890 (Oph)
 Silva, R. with Castaneda, 151 (Typh)
 do Silva, S. 414 (Misc)
 Silvestri, L. M. with Lobe 305 (Pl)
 Silvey W. J. with Jordan, 122 (Mal)
 Singh, B. 633 (Fer)
 Sinjovich, U. & Somani, A. G., *46 (Tryp)
 Sivalingham, V. & Rastomjee K. J. 663
 (Mal)
 Sirovsky M. 633 (Hel)
 Sloan, T. B. M. & Ebenener R. 359 (Lept)
 de Smadt, F. P. G. 626 (Pl)
 Sembois, J. with Hawking, 233 (Tryp)
 Smith, E. C. 688 (Y F)
 Smith, G. E. 811 (Mal)
 — Watson, R. B. & Crowell, R. L. 392
 (Mal)
 Smith H. H. 63 (Y F)
 — Calderón-Castro, H. & Leyva, J. P.
 77 (Y F)
 Smith, J. 123 (Lept)
 Smith, J. E., with Jahanella 857 (Oph)
 Smith, L. M. 105 (Der)
 Smith, R. O. A. & Ahmed, I. 448 (Lesh)
 — Hakler A. C. & Ahmed, I. 447 449
 (Lesh)
 Smithburn, K. C. with Mahaffy Hughes &
 Kirk 456 (Y F)
 — with Mahaffy Jacobs & Gillett, 759
 (Y F)
 Smotherman, W. M. with Schmidt &
 Christian 465 (Hel)
 Snapper I. 729 (B R)
 Smear P. A. T. 203 (Misc)
 Snyder J. C. & Anderson, C. R. 374 (Typh)
 Snyman, P. S. 68 (Rab)
 So H. 298, 299 (Mal)
 So T. with Akashi, 394 (Mal)
 Soares H. de A. 283 (Mal)
 Soedarmo, 569 (Mal)
 Soesman J. 315 (Dys)
 Sotopu M. 39 (Y & S)
 — with Tumbelaka, 39 (Y & S)
 Solkhar S. S. 300 (Pl)
 Solomon, H. C. with Hopp 685 (Mal)
 Somani A. F. with Sinjovich 246 (Tryp)
 van Someren, E. C. C. 73 (Y F)
 Sompayrac, L. M. with Milbpangh, 774
 (Hel)
 Sonu, R. L. 614 (Typh)
 Soong, H. Y. & Anderson, H. H. 171 (Lesh)
 Soper F. L. 548 (Y F)
 Sorige G. 22 (Mal)
 Soriano L. J. with Africa, & Dy 27 (Mal)
 Sorol, R. V. 418 (Misc)
 Sory R. 887 (Oph)
 Sosa Gallardo, J. with de Villafañe Lastra,
 & Fernando Videla, 309 (Pl)
 Soto, J. A. with Saldin de Rodriguez &
 Gaupietro, 704 (Hel)
 Sotolougo, F. & Goldberger J. 647 (Misc)
 Soeter A. W. with Kark & Hayward, 45
 (Sp)
 Southwell-Sander G. & Hand, R. F. 393
 (Mal)

Index of Authors

- de Souza Araujo H C 221 852 855 (Lep)
 Souza Lima, J S., 700 (Hel)
 Sparrow H 544 (Typh.)
 — with Durand & Giroud 546 (Typh.)
 — & Marechal P 543 (Typh)
 Spaulding, E H with Henderson & Gault
 767 (Lep.)
 Spies, T D with Bean & Blankenhorn 636
 (Diet.)
 — with Minnich, Wright & Moore 335
 (Pel.)
 — with Moore & Cooper 880 (Diet)
 — with Riddle & Hudson, 339 (Pel)
 — with Vultur & Bean 574 (Diet)
 Squires, B T 326 (Diet)
 Stannus, H S 65 (Y F) 784 (Diet.)
 — & Bendrt, M 342 (R F)
 Staples R R 606 (Tryp)
 Starbuck E B & Ward T G 848 (Lept.)
 Staupendahl, W with Fischer 434 (Mal)
 Stayer M C (575) (Misc)
 Stefanopoulos G J & Chové J 127 (Lept.)
 Stein, A A & Wyszchnewsky A A 222
 (Lep)
 Stein L. & Wertheimer E 747 (Leish)
 Steinman J F with Ynske Hahn & Clark
 276 (Bl.)
 Stephens F L 103 (Der)
 Steuer W 372, 678 (Typh)
 Stewart, M A. & Evans, F C 616 (Pl.)
 Steyn D G 51 (Misc.)
 — & van der Walt, S J 800 (Misc)
 Stickler W H with Vinton, 578 (Misc.)
 Stiles G W & Davis, C L 790 (Der)
 Still R M L & Lal T N 393 (Mal)
 Stokes R J & Ortiz J 618 (Am)
 Stone W Jr with Thygeson 887 (Oph.)
 Stovall W D & Penno S B 580 (Rab)
 Stranaky E & Pecache L V 411 (Misc.)
 Stratman-Thomas, W K with Dulaney &
 Warr 119 (Mal)
 Strash M with Schwarz, (709) (Hel.)
 Stroef G M. & Karmawan, R., 797 (Misc)
 Strickland C 281 (B R)
 — & Roy D N 578 (Misc)
 Strong, R P 352 (B R.)
 Stunkard, H. W (93) (Hel.)
 Suarez R. M. & Morales, F H 322 (Dys)
 Subedar S A. 407 (Vms.)
 Sukhatme P V with Rao 185 (Hel)
 Sulzberger, M B & Asher C. 762 (Y.F)
 Sundararajan, A. R. 333 (Bb)
 Swaminathan, M., (336) (Pel)
 Swartzwelder J C. 102 (Hel.)
 — & Adams C C. 600 (Mal.)
 — & Cali S J 796 (Misc)
 Symes C B McMahon J & Haddow A J
 577 (Misc)
- T
- Talce R V Costa R. S & Marra J A. 536
 (Tryp.)
 Tan S with Liu Chang & Chuan 179 (Mal)
 Tanaka, S 121 251 (Mal)
 Tanganyika Territory 326 (Diet)
 Toubes G A. 719 (Vms)
 Trowaki, A with Block & Green, 36 (Dys.)
 Truwell C. M., with Hess, 605 (Mal)
- Taylor E 640 (Vms.)
 Taylor F W 895 (Misc)
 Taylor J 838 (Chl)
 Tchernomoretz, I with Adler 173
 (Leish) 524 (Mal)
 Teedale C 833 (Y F)
 Ter Heege F H 417 (Misc)
 Tensar W C with Wyckoff 590 (Rab)
 Teske J M 488 (Misc)
 Thaddea S with Oettel 638 (Sp.)
 Thomas E P with Faust & Jones 189 (H)
 Thomas J O with DeEds 6 (Hel)
 Thompson, H Q F 57 (Misc)
 Thompson M L R with Martin & Accou
 464 (Hel.)
 Thomson R C M 293 397 bis (Mal)
 Thygeson P & Stone W Jr 887 (Oph.)
 Tibert P Q T 190 (Hel)
 Tiedt J with de Waal 200 (Misc.)
 Tillsch, J H with Wyrens & Magath 19
 (Hel)
 Tisseul, J with Marchoux, Chorine &
 Chabaud 834 (Lep)
 Tolmas, R L. 603 bis (Leish.)
 Tomb J W 163 459 (618) (Chl)
 Tomuta, S 101 (Hel)
 Tonkin I M with Brownlee 35 (Dys)
 Topping N H 148 379 (Typh)
 — with Bongtoun, 146 539 (Typh.)
 Toranzo L B 427 (Mal)
 — Figueroa M L & Barbara L. 244
 (Tryp.)
 Tornack J H 82 (Hel)
 Torrealba J F 245 746 (Tryp)
 — & Ricciardi, B 248 (Tryp)
 Torres, C M 169 (Leish) 672 (Tryp)
 Torres, D M G 466 (Hel.)
 Tostes, J & Brets, G 453 (Typh)
 Toumanoff C 117 (Mal)
 — with Mienn 180 (Mal.)
 Trager W 440 441 (Mal.)
 Tratman, E K. 411 (Misc.)
 Trella, J O & Lazarte J 468 (Hel.)
 Trowell H C 483 (Haem) 638 (Diet.)
 — with Muwzu & Hendessoy R. S F
 896 (Misc.)
 Try H T with Genevray 177 (Mal)
 Tsai C with Wu 201 (Misc.)
 Tsuchiya, H. 708 (Am.)
 Tsuda K with Ishii & Shimizu, 126 (R.F)
 Tubangui, M A & Aguila P J 487 (Hel.)
 Tucker C B & Chusolin, J M. 858 (Hel.)
 — Woodring T V & Esnick, H. C. 145
 (Typh.)
 Tumbelaka, J F & Soetopo M 39 (Y & S)
 Tunçman Z M. with Uzman & Akcel, 84
 (Rab.)
 Tweedle D R. Reid J A. & Hodgkin E. P.,
 522 (Mal)
 Tweedle, M. W F with Scharff 814 (Mal.)
 Tyndel M. 591 (Rab.)
- U
- Uganda Protectorate 76 (Y.F)
 Unanue E. & León, F., 14 (Hel.)
 Union of Soviet Socialist Republics, 538
 (Leish.) 555 (Am.) 567 (Hel.)

Utti, O with Ramon, 297 (Mal)
 Uitz, F (472) (Hel)
 Urmann, M-O Akcel, I S & Tunçman
 Z M 84 (Rab)

V

Vaccaro H & Parfeth, A 732 (Typh)
 Vaillant, C M 255 (Mal)
 Vance B M & Fisher R C 716 (Haem)
 Van den Branden M 237 (Typh)
 Van der Sar A with Pot & van Raalte 552
 (Dys)
 Van der Walt S J with Steyn, 600 (Misc)
 Vargas, L (189) 778 (Hel) 295 bis 296
 (Mal)
 — & Betteln, E (440) (Mal)
 — with — 670 (Mal)
 — Cases, G & Earle W C 430 (Mal)
 — & Zozaya, J 693 (R F)
 Vargas Coillier P I 693 (A & S)
 Vanciel, M 743 (Typh)
 Var, E 83 (Rab)
 Vanquere-Colet, A with Kitagawa 296 (Mal)
 van Veen A G 329 (Bb)
 Veeraraghavan, N 560 (Rab)
 Ventemillas, F 141 153 (Typh)
 Vack, S F 742 (Mal)
 Vellard, J 865 (Vms)
 Velpulay M 412 (Misc)
 Venhuis, W G 254 736 737 (Mal)
 Venkatesubramanian C S 223 (Lep)
 Venkateswara, K V 181 (Chi)
 — Krishnaswami A K & Ramakrishnan,
 C S 160 (Chi)
 — & Ramakrishnan C S 453 (Chi)
 Verghese, G 153 (Chi) 216 (Lep)
 Verhaart, W J C 196 (Misc)
 Verma, V & Gomes B F 400 (Mal)
 Verma, W with Remant 5 (Hel)
 Veronesi B 27 603 (Mal)
 de Villaloba Lanza T Sora Gallardo J &
 Fernando Velez, L 309 (Pl)
 Villela, E 74 (V F)
 — & Para, M 645 (Der)
 Villela, F Pastana, B R & Penda S B
 610 (Lamb)
 Villegas, N 707 (Hel)
 Vilter R W Bess W B & Speer, T D 874
 (Diet)
 Vinca, A 521 bis (Mal)
 Vint, F W 264 (B) 687 (Pl)
 Vinton, K W & Stockler W H 576 (Misc)
 Viole, H & Joyeux, C 379 (Typh)
 Viswanathan, D K 180 251 428 435 (Mal)
 — Das, S & Oommen A V 598 (Mal)
 Vitug, W Cruz, J R & Bautista L D 11
 (Hel)
 Vladescu R with Bertrand 787 788 (Vms)
 Vogel, H 581 593, 700 (Hel)
 Vobo, E., with Katus & Raus 291 (Mal)
 Voretsch, A M (791) (Misc)
 Vryona, G 178 (Mal)

W

de Waal, H L 200 860 (Misc)
 — & Tiedt, J 200 (Misc)
 Wade, H W., 223 (Lep)

Wagner S with Cooper & Zucker 234
 (Dys)
 Waihab, with Siegenbeek van Heekelom, 267
 (Mal)
 Walker H A. & van Dyke, H. B. 441 (Mal)
 Wall, L M with Lecheering & Donelson
 480 (Haem)
 Walther G 542, 612 (Typh)
 Wang, C W with Liu, Zia & Cheng, 612
 (Typh)
 Ward, T G with Starbock, 848 (Lep)
 Ware, R L with Brown, 436 (Mal)
 War Medicine, Chicago, 277 (Misc)
 War Office, 21 (Mal) 680 (Typh)
 Warr O S with Dulaney & Stratman-
 Thomas, 119 (Mal)
 Watson, M 814 (Mal)
 Watson, R B & Maber H C 291 (Mal)
 — & Rose M E 436 (Mal)
 — with Smith & Crowell, 392 (Mal)
 Wax W V & Cooper N S 192 (Hel)
 Webster L T & Casah, J 82 (Rab)
 Weidman, F D & Rosenthal, L H 106
 (Der)
 Weiss, W 273 (B)
 Weib, A L with Hale 620 (Am)
 Wenger P 225 (Lep)
 Weirich, D H & Arnett, J H 554 (Am)
 Wertheimer E with Stein, 747 (Lamb)
 Wertman K with Plotz, 680 (Typh)
 Werner H 155 (Fev)
 West E with Hagner & Dobler 124 368
 (Mal)
 West, E M B 646 (Misc)
 Westphal A 643 (Am)
 Wetzel U 367 (Typh)
 Weyer F (810) in (Mal)
 — & Hundertmark, A 428 (Mal)
 — with Nauck, 368, 363 (Typh)
 Wheeler C M & Douglas, J R, 618 (Pl)
 — & Evans F C 307 (Pl)
 White, R S 254 (Mal)
 Wahl, D G 481 (Haem)
 Wilcock, C 48 (Misc)
 Wilcox, A with Roe & Latha, 484 (Misc)
 Wilde H J with Boelando, 116 (Mal)
 Wildish, G H 486 (Misc)
 Wile U J & Mandt, L K 433 (Mal)
 Wilhelm O 469 (Misc)
 Williams, A W 417 (Misc)
 Williams, E F with Anderson & Morrison
 811 (Mal)
 Williams R D with Mason, (233) (Bb)
 Wilks J D with Blackson, 82 (Hel)
 Wilson, C with Blacklock, 233 809 (Mal)
 Wilson, R P 887 (Oph)
 Wilson, P W 672 (Hel)
 Wilson, R with Derry & Card, 645 (Der)
 Wilson, W J & Blair E M McV 319 (Dys)
 Winckel, C W F 121 601 (Mal)
 Winfield, G F with Meng, 630 (Misc)
 Wingfield, A 48 (Misc)
 Wingfield, A L 172 (Lamb)
 Wohlrah, R 647 626 (Typh)
 Wolfe D M with Patrick, 226 (Lep)
 Wong, Y R with Liu, 476 (Hel)
 Wood S F 244 445 671 (Typh)
 Woodhead, L S F & Datta, U C 147 (Typh)
 Woodman, H M & Bokhan, A., 163 (Hel)

- Woodring T V with Tucker & Essick, 145 (Typh.)
 Woodley E J S. 12 (Hel)
 Wright F J 432 (Mal.) 688 (Pl.)
 Wright, H W S (32) (Am)
 Wright, S. T with Minnick Moore & Spies, 335 (Pel)
 Wu C. C. with Yao (169) 449 (Leish.) 389 (Mal.)
 Wu C. H & Tsai C. 201 (Misc)
 Wyatt, T E & Buchholz R R 32 (Am)
 Wyckoff R W G & Tesar W C 590 (Rab)
 Wynns H L with Davis & Beck 556 (R F)
 Wyrens, R G Tillisch, J H & Magath T B 184 (Hel)
 Wyschniewsky A A with Stein, 222 (Lep)

Y

- Yang R T 53 (Misc)
 Yao H Y with Pollitzer Lai & Chen 159 (Chl.)
 Yao Y T & Wu C. C. (169) 449 (Leish.) 388 (Mal.)
 Yoell, M. with Klingler 255 (Mal.)
 Yokogawa S with Ro 15 (Hel)
 Yorke W 739 803 (Mal.)
 — with Fulton, 433 (Mal.) 533 (Tryp)
 Yosino T & Nakasato T 183 (Hel)

- Young, M D 400 (Mal)
 — with Coatney 600 (Mal)
 Yu T F 83 (Rab.)
 Yuan I C with Ho & Chu 169 (Leish.)
 Yuile C L. 525 (Bl)
 — & Clark W F 278 (Bl.)
 — Stenaman, J F Hahn P F & Clark W F 278 (Bl.)

Z

- Zain, H 28 bis 669 (Mal)
 Zebouni N with Senekji, 167 (Leish.)
 Zellweger H 870 (Hel.)
 Zessler H with Oelkers, 709 (Hel.)
 Zia, S H with Liu, 143 144 (Typh.)
 — with — Chung & Wang 613 (Typh.)
 Zikoyev V V 517 (Mal)
 Zouaya J with Vargas, 603 (R.F)
 Zachucko, J 605 (Tryp) 831 (Diet)
 Zucker R. L. with Cooper & Wagoner 324 (Dys)
 de Zulueta, J 809 (Mal)
 Zumpf F (818) (Tryp)
 — with Nanck, 366 (Typh)
 Zunino E with Jacobo Spangenberg & Belgrano, 96 (Hel)
 Zupnik, D 690 (Typh)
 van Zyl W J & Gear J 236 (Tryp)

INDEX OF SUBJECTS

(The entries in heavy type refer to Sections in which abstracts on the subject indicated are grouped together Page numbers within brackets indicate papers cited by title only)

- Acclimatization heat, in man, 351 579
Acetabularia poisoning, 51
 Actinomycosis of thorax
 in Brazil, in child, 644
 treatment by potassium iodide 644
Adrena d. gluta poisoning, 51
 Adrenal cortex degeneration of, produced by
 germanin, 240
Aedes spp.
 of henna 73
 breeding in pineapple and banana plants, 633
aeq. fr.
 biting by effects of are fertilization and
 light on, 490
 control, 68 77 683
 Gambusia Lohrecks 78
 overwintering of in Oklahoma, 74
 transmitting *Py. trichospori* infection 576
Aelopus susceptibility to infection with *F.*
 malarii 708
Amphoeus and yellow fever in Uganda, 615 769
Amphoeus in Sudan 70
 African Yawn Medicine (book review) 724
 Age resistance to helminth infections 624
 Agranulocytosis
 following sulphathiazole fatal case, 498
 kala azar and, 608
 Anabasi
 in England 487
 U.S.A. 458
 histology 487
 Aircraft, disease transmission and 458
 control of 458 549 763
 Aleutian diseases of Gulf of Guinea, 348
 Ambians spp. feeding habits of 633
Ameliorans
 capensis
 and leprosy transmission 855
 typhus and in Brazil, 545 828
 lepro. rousum infected naturally by *T. cruzi* 247
**AMOEBIASIS AND INTESTINAL PROTOZOAL
 INFECTIONS, 25-33, 313-319**
 354-356 618-621 763-768
 839-845 see also *Entamoeba*
histolytica
Amoebama, 16
 in Abyssinia 348
 Brazil Bello Horizonte 5
 Canada, 554
 China Peking 613
 Gulf of Guinea 348
 India 555
 Mexico 313
 in school-children 619
 Porto Rico 618 636
 South Africa, Natal, 29 619
 Witwatersrand, 313
 U.S.A. 554 839 840 841 842
 U.S.S.R., 860
 Venezuela, 463
 actiology 839
Amoebiasis—*see*
 atypical, 842
 complications
 pulmonary 31
 surgical (32) 315 840
 control, 277
 cutaneous
 in U.S.A. 32
 treatment, 32
 diagnosis 766, 841
 endoscopic 647
 sigmoidoscopy 29
 diet and 839
 duration of infection, 554
 hepatic 29 314, 619
 intestinal, cutaneous reactions in, 845
 infestation caused by (555)
 liver abscess
 in Dutch East Indies 318
 Ireland, Northern, 316
 passing into peritoneal cavity (620)
 diagnosis, (556)
 perforating lung (620)
 treatment 316 (556)
 neonatharian, 620
 Loeffler syndrome and 762
 pulmonary in Natal 31 619
 radiological investigation of 844
 symptomatology 841
 transmission 839
 treatment 30 33 77 841
 arsmetine 30
 carbamazepine 30 555 619 840
 chaperro 30
 chloroform 840
 conium 30
 emetine 30 555 620 792, 842
 bermuth iodide 30 33 555
 entoroxoform 30 317 555 845
 gavano 30
 kroam 318
 Kercho alkaloid 555
 bermuth iodide 30
 kurchine hydrochloride 30
 quinovyl 30 840
 rianol, 29
 stovanol 30
 arsenical poisoning following, 30
 yatame, 318
 yatren 555 843
 typhoid fever and, 843
 Anemia
 in India, Coorg, 895
 in adolescents, 481
 haemolytic
 following phenothiazine therapy 864
 following sulphathiazole therapy blood
 transfusion in, 268
 hookworm
 in Gulf of Guinea, 348
 treatment, 100

Index of Subjects

- Anaemia—*cont*
 hyperchromic
 macrocytic, 639
 hypochromic
 microcytic 639
 in Indian tea garden coolies malnutrition and 418
 macrocytic
 in Gold Coast, in women 482
 treatment, 482
 liver extract 483
 megalocytic
 in Northern Rhodesia 482
 treatment, 482
 pernicious
 aetiology 637
 and sprue gastric conditions compared 715
 post malarial 19
 in pregnancy in Calcutta 785
 puerperal sepsis and, 203
 sickle-cell, 639
 in U.S.A. 716 717
 complications cerebral necrosis 717
 detection of 718
 heart in 639
 symptoms, 716
 sub-clinical in children in Southern Rhodesia 883

ascylotoma
brasilense
 in cats and dogs, in Chengtu 627
 in cats in Chengtu 627
 eggs buoyancy of, 771
 mal Parasites Immunity against [CULBERTSON] (book review) 335
 ascylotoma host of *Echinostoma* 629
 in Argentina, Comentes Province 96
 Brazil
 on coffee plantations (476)
 São Paulo 473
 Ceylon 570
 China, 893
 India, Coorg, 893
 Germans returning from Africa, 859
 Japan Iragaki Island, 87
 Philippine Islands, Cebu 216
 Porto Rico 638
 Tunis 473
 U.S.A. 772
 age resistance to 624
 anaemia, treatment, 100
 anasarca in 569
 Bufo marinus as vector of 561
 cardio-vascular system in 473
 complicating leprosy 851
 control, 96 277 772
 diet and 624
 differential leucocyte count in, 89
 genetic constitution and 624
 Necator infection
 in Brazil, 473
 Bello Horizonte 5
 on coffee and sugar cane plantations (476)
 Samoa 872
 U.S.A. in naval personnel, 472
 Venezuela 465

 Ankylostomiasis—*cont*
 Necator infection—*cont*
 treatment by tetrachlorethylene of worm following, 473
 nephrosis and, 707
 treatment, 277
 ascaridol 859
 Bederman, 859
 chenopodium oil, 859
 phenothiazine failure of 861
 secretin 859
 tetrachlorethylene, 473
 in women in tropics, 203
 Anopheles
 of Abyssinia 391
 Africa, (810)
 Albania, (253) 359
 Argentina 115
 ricefields, 292
 Assam 428 598
 Bohemia, 595
 Brazil S. Vicente 297 (516)
 British Honduras 296 736
 Bulgaria, 602
 Costa Rica 290 291 296
 China Hainan, 251
 Cuba 513 514 515
 Dutch East Indies, 736
 Federated Malay States 258
 India
 Calcutta microsporidia infesting, 664
 Madras 598
 Orissa 299
 Indo-China, Tong Sontay region, 177
 Italy Lower Volturno 18
 Kenya, Kisumu, 595
 Macedonia, (810)
 Mediterranean Region (810)
 Mexico 296
 Moravia 595
 Palestine 592
 Portuguese East Africa 294
 Syria, 516
 Trinidad, 664
 U.S.S.R. 890
 U.S.A. Eastern distinguishing of, (285)
 breeding places of in S. Vicente 297
 collection of on board ship 809
 control 435 521
 in Palestine 592
 Sierra Leone 814
 U.S.A. Tennessee Valley 261 262
 438 740
 in aircraft, 458
 automatic siphon sluice 262
 bonification 18
 drainage
 experimental wells, 397
 fascine 522
 engineering 259
 erosion, 260
 fish breeding, 667
 flushing, 814
 house-proofing, 261 262 436
 insecticides, Pyroclide 20 180 435
 larvicides, 396
 chlorophenol, 603
 comparative value of 122
 Cooper's Anti-Malarial Fluid 259

Anopheles—cont
control—cont

larvicide—cont

copper sulphate 181

Malanot 259

nitrum oil, 260

Paris green 435 602 606

phenol, 123

pyrethrum

increasing toxicity of 491

powder in colloidal solution 122

oiling 253 396 435

automatic drip system 437

Pampana siphon for automatic flushing of streams 4 262

Pyrethroid 70 180 435

relation of plants to 740

shading, 435

shaking -4 302, 435 437 (438) 814

spraying 180 181 435 667

trapping, 436 515

ecology of aquatic plants in 294

infected with

P. jaykari incubation temperature of, 392simultaneously two strains of *P. vixax* 431

larvae surface tension of water and, 427

neotropical, subspecific variations among, 811

sexual behaviour of, (350)

Tarsomaculatus complex of (431)

transportation of, 810

Anopheles

aeneus

in Dutch East Indies, on stream banks, 736

and malaria

in Dutch East Indies, 737

Indo-China, 177

aeneus ex. and malaria

in Caribbean area 436

Costa Rica, 290 291

Cuba, 513 514 515

aeneus, eggs of, 296*aeneus*, breeding places of, 300*aeneus*, and malaria

in Assam 428 506

India, Orissa, 299

aeneus in Ex. eggs of, 296*aeneus*, eggs of, 296

bitor

behaviour of, 664

and malaria in Trinidad 664

naturally infected with *Plasmodium* 430

claviger

in Texas, (516)

breeding places of 399

claviger larvae ecology of in borrow pits 599

darlingi

in Brazil São Paulo 737

British Honduras, 430

Guatemala 430

Spanish Honduras, 430

eggs of, 296

and malaria, in British Honduras, 296

claviger (A. aeneus), and malaria in Palestine 392*claviger* s. sp. (736)*claviger*, habits of, (234)Anopheles—cont
funeraria

in Southern Rhodesia, 443

breeding places of, 260

flight range of, 391

and malaria

in Southern Rhodesia, 290

Uganda, 391

seasonal incidence in Kenya, Kisumu, 305

gambae

in Abyssinia, 17

Southern Rhodesia, 443

breeding of

in Sierra Leone, Freetown, 253

places of, 260

and malaria

in Abyssinia, 391

Southern Rhodesia, 290

seasonal incidence in Kenya, Kisumu, 305

gambae var *mariae* breeding of, in Sierra Leone, Freetown, 253*gambae*, breeding places of, 300*gambae* eggs of, 297*gambae* and malaria, in Upper Assam 177

maculipes

habits of, 234

and malaria, in Assam, 428

marshii

breeding places of, 300

race *subopacatus*, oviposition, preferred temperature for 428race *claviger* malaria and, 18race *labranchiae*

malaria and, 18

oviposition preferred temperature for 428

race *mariae*

behaviour of hibernating females of, 253

breeding places of, 300

oviposition, preferred temperature for 428

race *subopacatus*

breeding places of, 300

and malaria

in Albania, 309

Macedonia, 309

resistance to cold, of females, 116

race *subopacatus* breeding places of, 300race *typicus*

breeding places of, 300

oviposition, preferred temperature for 428

meris

in Syria 516

breeding places of, 300

meris eggs of, 297in *albus*

behaviour of, in relation to feeding and resting, 507

breeding places

in cold weather 507

selection of, 293

and malaria

in Assam, 180 251 428, 435 506

Indo-China, 180

var *flaviventris*

in Dutch East Indies, on stream banks 737

breeding of, physicochemical factors affecting, 19

Imophies—cont
neomaculipalpus eggs of, 296
noctumbrosus and malaria in Selangor 182
oswaldi
 and *A. tarsimaculatus* relationship
 between, 738
 eggs of, 296
 var *mutalis* in São Paulo 737
 var *oswaldi* eggs of 297
phaerosis in Abyssinia, 17
philippinensis transmitting malaria and filaria
 simultaneously 477
plumbeus breeding places of, 389
pseudopunctipennis
 distribution of 293
 eggs of 296
 and malaria,
 in Argentina 113 292
 Chile 427
 Mexico 430
pseudopunctipennis willardsi n. var. 293
pulcherrimus resistance to cold, of females
 118
punctimacula eggs of, 296
quadrimaculatus
 flight range of 392
 infected with
P. cynomolgi 400
P. lophurae 400
 kept shelter as diurnal resting place of,
 811
 larvae inheritance of colour patterns in
 (430)
 and malaria in U.S.A. 400
 susceptibility to malaria parasites, 430
stephensi
 breeding, chemical character of water for
 391
 experimental malaria infections in 391
stephensi mayorensis insectary colony of, 117
strodei, eggs of 296
sundensis transportation of, 810
superficius
 breeding places of, 389
 and malaria in Albania, 389
 resistance to cold of females, 116
tarsimaculatus
 and *A. oswaldi*, relationship between, 738
 and malaria, in Trinidad 664
triannulatus eggs of, 296
umbrosus and malaria, in Selangor 182
varius habits of (254)
vestipennis
 eggs of 296
 and malaria
 in British Honduras, 296
 Cuba, 514

Anthelmintics
 aluminum chloride 787
 ascaridol, 859
 Boderrin, 859
 betanaphthol, 787
 carbon tetrachloride 767
 chenopodium oil, 767 859
 chlorcarvacrol 767
 chloroform, 787
 clothymol, 767
 copper sulphate 767
 death following use of, 870

Anthelmintics—cont
 detoxication, 464
 equine phenothiazine 6
 filmaron 767
 gentian violet 781
 hexylresorcinol, 767
 lubosan, 767 859
 menthol 767
 native of Thailand 564
 oleum eucalypti, 767
 oleum tannacetii, 767
 oleum terebinthinae 767
 pelletieria sulphate 767
 phenothiazine 6 192, 781 861
 biliary excretion and anthelmintic action of
 thionol 6
 failure of, 861
 purification of 861
 toxicity of, 193 464 465 560 864
 toxicology of 862
 rotenone 767
 santonin 767
 secretin 859
 tetrachlorethylene 473 767
 coma following 7
 thymol 767
 toxicity of 864

Anthrax
 in China Pespang 613
 U.S.S.R. 890

ANTIVENERES AND VENOMES, 405-410 640-642 718-720 787-796 884-886

snake
Crotalus cornutus 886
Crotalus polyvalency of 407
Naja ferox standardization of 407
Naja 886
Notachis scutatus 405
 viper
Buteo asiaticus standardization of 407
Viperina aspis 884

Anuria in cholera 163 165 459 (618)

Appendicitis
 caused by
S. japonicum 466
S. marseus 465
 and *Enterobius vermicularis* 192, (709)
 relation of appendiceal *Enterobius* infection
 to 634
 relation of schistosomiasis of appendix, 628
 typhus simulating, 542

Arboviruses, 785
 and Plummer Vinson syndrome 536

Armigeres obscurus susceptibility to infection
 with *F. malayi* 708

Arthritis in Gulf of Guinea, 348

Ascariasis, 101
 in Brazil, 473
 Bello Horizonte 5
 China, 893
 Germans returning from Africa, 859
 India, in child 671
 Porto Rico 638
 Samoa 872
 U.S.A. 858
 Venezuela 465
 age resistance to 624
 antibodies in, (102)

Index of Subjects

- Blood—cont
 in blackwater fever 264
 in cerebral cysticercosis, 705
 in cholera, 164
 comparative values in racial groups in tropics 53 54
 concentration determination of 184
 Diseases, Synopsis of (book review) 727
 of Europeans tropical climate effect of on 202
 groups and leprosy 697
 haemostatic properties of snake venom 405
 of high-school children in U.S.A. 480 481
 of Indian women in Calcutta 481
 in kala azar 170
 in leprosy 224
 in malaria 178 273 393
 picture
 in Strongyloides infection, 101
 in trichiniasis, 197
 pressure
 of Africans, 417
 studies, in Virgin Islands, 888
 standards for Chinese 201
 sugar in malaria, 299
 in thrombophlebitis, 199
 transfusion
 in blackwater fever 268, 531
 malaria transmission and, 252
 in yellow fever 548
 Blue disease
 in Colombia in Chillo Indians 113 643
 aetiology 113 643
 diagnosis, differential from
 pinta, 643
 leprosy 643
 syphilis 643
 vitiligo 643
 BOOK REVIEWS 58-60 205-206 281-284 352-358 493-496 723-728 798-800
 Bored hole absorption pits 349
 Boutonneuse fever *see under* TYPHUS GROUP
 OF FEVERS, tick borne
 Brucellosis *see* Undulant fever
Bufo marinus vector of helminth ova in Porto Rico 581
 Caloncoba butter pharmacology of (857)
 Cancer
 of lip myiasis complicating (350)
 of liver
 in Bantus, 488 578
 Malaya, 578
 aetiology 488
 in mice painted with Bantu liver extracts, 578
 of mouth in betel-chewers 489
 relation of *Gongylonema pulcrum* to 633
 schistosomiasis and 10
 treatment by cobra venom, 407
 Carcinom oris *see* Noma
Candelebra euphorbia poisoning 51
Cannabis sativa and mental disease in India 783
 Carbon tetrachloride poisoning 631
 Carrión's disease *see under* BARTONELLOSIS
 Cataract
 in India, 404
 Nigeria, 889
 Catarrh Koch-Weeks, in India, 404
 Cephalosporium rectifol 107
 Cerebral disorders in Batavian children, 188
 Chagas's disease *see* TRYPANOSOMIASIS
 human American and Trypanosoma cruzi
 Chellous treatment by vitamin B 573
 Chiggers, 54
 Child welfare in Tonking 57
 Chilomastix infection
 in Brazil Bello Horizonte 5
 Mexico 313
 Chamberl, diagnosis differential from purd
 Chinese Lessons purd 114
 Contribution to Geographical
 Medicine from the Clinics of
 P U M C (book review) 726
 617-618 690
 CHOLERA, 157-167 458-460 617-618 690
 764 838-839
 in China 159 277 613
 Peiping 613
 Yunnan, 159 277
 India 159
 Bengal 157 158, 458
 Moradabad, 690
 Orissa, 158
 U.S.S.R. 690
 anuria and 163 165 459 (618)
 blood in 164
 complications, renal 459
 control 158 277
 in China 277
 dehydration, treatment 165
 epidemiology 157 (169)
 experimental, use of mucin in 784
 fairs and festivals in spread of 158
 hypochloreaemia in 162
 immunization 277
 vaccines, sterility and potency of 166
 phage
 in soil 162
 type N 162
 pregnancy and 690
 Prophylaxis 159
 renal function in, 163 459
 research in India 636
 rôle of *Bact coli* in 690
 Summary of Recent Abstracts 1-5
 toxin, 618
 treatment, 277 (618) 690
 experimental sulphonamides, 784
 pyrogen-free saline 166 839
 sulphaguanidine 459 838
 uraemia and 163 690
 vibrios
 differentiation between, by bacterioidal
 technique 617
 drying recovery of following, 617
 El Tor
 distribution in India, 159
 in natural sources of water in absence of
 cholera, 160
 reversion of water vibrios to 166
 serology of, 836
 viability of 161
cholerae
 distribution in India, 159
 and El Tor action of on goats red
 corpuscles, 838

- Cholera—cont.**
vibrio—*cont.*
F. cholerae—*cont.*
 isolation of, 181
 preservation of specimens for isolation of, 458
- Chromoblastomycosis, see also Blastomycosis**
 in U.S.A. 106
 diagnosis, differential from
 blastomycosis 104
 coccidioidal granuloma 104
 Madura foot, 104
 tuberculous verrucosa cutis 104
 treatment, 106
- Chrysomya** *levis* as infection of cattle in
 Southern Rhodesia 443
- Circa**
hemiformis
 and *C. leucodermis* comparative physiology of
 55
 geographical distribution of 55
leucodermis
 and *C. hemiformis* comparative physiology
 of 55
 geographical distribution of 55
- Cinchona** Colombian, 433
- Culex**
pipiens (307)
richardsoni experimental host of *Trichinella*
piralis 633
- Climate**
 influence of, on health, 492
 tropical
 effect of, on blood of Europeans, 202
 physiology of, 351-579
- Clostridium** *novus* in cats in Chengtu 627
- Coccidioidomycosis**
 in U.S.A. 790
 aetiology, 790
 animal, diagnosis 790
- Coccyzus** *ulterior* (new) causing cystitis (com-
 plication of bp cancer (350))
- Coccidiosis** *crystallina* in man, in Britain 631
- Coccyzus** infection, in African native 877
- Cobra**, bite, caused by *F. aspidotis* (14)
- Colera** *extremum* *pomorum* 51
- Conjunctivitis**
 in India, 401-404
Nagari, 889
 acute follicular (Beal type) in India, 401
 infection, 887
- Corbula** *leucodermis* intermediate host of *Schae-*
tomma 639
- Cordiales** *anthropophaga* infection in Southern
 Rhodesia 443
- Cornea**, epithelial dystrophy of in Trinidad 403
- Creeping eruption**
 in U.S.A. 774
 control, 774
 treatment, 774
- Crush syndrome** 439
 suppression of urine in, 185
- Culex** larvae, microscope for identification of,
 630
- Culex**
quadrifasciatus vector of *P. gallinaceum*
 (346)
 vector susceptibility to *H. murrayi* 183
- Cyberoxys**, bites treatment by chloroform, 35
- Cysticercosis**, 92
 in Uruguay 704
 aetiology 94
 of brain, 82, 704 (706)
 in Peru, 468
 blood in, 705
 symptoms, 468
 treatment, 468
 diagnosis
 differential, 704
 radiography, 704-705
 epilepsy and, 92
 treatment by sulphathiazole 468
 experimental, treatment by atabrin, 631
 muscular 704
 pathology 704
 symptoms, 704
 treatment, 94
 unrecognized, 705
- Cysticercus**
colubae detection radiographic, in man
 literature and central nervous
 system, 91
faciatis infection, genetic constitution, 62
- DEFICIENCY DISEASES**, 323-328, 479-479 573-
 575 635-637 709-711 734-
 783 877-882
 in South Africa, 328
 Tanganyika 325
 Uganda 325
 U.S.A. Alabama 339
 absorption of galactose from gastro-intestinal
 tract, 334
 relationship to resistance to infection, 339
 symptom eye ocular 403 404
 Dehydration treatment 185
 Deltaic Formation with Special Reference to the
 Hydrographic Processes of the
 Ganges and the Brahmaputra
 (book review) 231
- DENGUE**, 833-834
 in Gulf of Guinea, in Europeans, 348
 India, 833
 Degeneration and oedema, in Belgian Congo
 Kasai, 99
- Dermatocyst**
andersoni as disease carrier in Canada 201
carabalis, causing tick paralysis, 649
- Dermatitis**
 contact from mercuric hydrochloride, 650
 coral in West Indies, 114
schistosoma
 in U.S.A. 1, 567
 control 567
- DERMATOLOGY AND FUNGUS DISEASES**
 107-115 454, 647-648 789-
 791
- Dermatophytes**, fungicidal action of copper
 sulphate and parantrophobol
 on, 103
- Dermatosis**
 of Gulf of Guinea, 348
 blue
 in Colombia, Chillon Plateau, 113 643
 aetiology 113 643
 treatment by arphenamine 113
Dermosporidium *hyalinum* 434
 Desert sore, 483

- Diabetes mellitus symptoms ocular 403
 Diarrhoea infantile treatment by
 sulphapyridine and banana, 324
 sulphathiazole 324
 Diboba, in Belgian Congo Kasai, 99
 Dicrocoelium infection diagnosis, skin tests 860
 Dictyocaulus filaria infection age resistance to 624
 Diet
 of Dutch East Indies 329
 India, 328 329
 Uganda, 325
 amoebiasis and 839
 ankylostomiasis and 624
 ascariasis and 624
 helminthiasis and 624
 floor rice intestinal changes in monkeys fed on, 678
 Strongyloides infection and 624
 Trichinella spiralis infection and 624
 Dioscorea hirsuta poisoning 52
 Diphtheria
 in China Peiping, 613
 U.S.S.R. 890
 immunity in Gulf of Guinea 348
 Diphyllodactylum
 mansoni
 in cats in Chengtu 627
 infection *see under* Tapeworm infection
 minus life cycle of 567
 Dipylidium caninum in cats and dogs in Chengtu, 627
 Diptera, myiasis-producing, in man 578
 Dirofilaria
 immitis infection, treatment by sulphanilamide and foudadin 180
 louisianensis n. sp 189
 infection in U.S.A. New Orleans, 189
 Diseases
 of East Africa, 348
 Gulf of Guinea, 348
 Blood Synopses of (book review) 727
 epidemic, of U.S.S.R. 860
 infections of New Guinea (791)
 insect borne transmission by aircraft 458
 skin, in China 883
 tropical
 Colombian monkeys as reservoirs of 791
 Stitt's Diagnosis Prevention and Treatment, 6th edition [Strong] (book review) 352
 and Sub-Tropical (book review) 728
 of Witwatersrand, (48)
 of women in tropics, 203
 Distomum, cutaneous, in Argentina 565
 Djengol poisoning, 490
 Dracontiad, in Gulf of Guinea, 348
 India, 633
 West Africa, 778
 control, Ambasia spp in relation to 833
 diagnosis 778
 incidence 778
 pathology 778
 research, (780)
 symptomatology 778
 treatment by phenothiazine 778 861
 Dracunculus cyst, 633
 Dracunculus medietatis life history of (632)
 Drainage fasciae 522
 DROPSY EPIDEMIC, 339-342, 711-713
 in India Bengal 713
 aetiology 341
 Argemone oil and 713
 application of biological test to 340
 detection of 711
 obtaining of from mustard oil, 339
 toxicity of 340
 epidemiology 339 340
 mustard oil and, 712
 Argemone oil theory of, 711
 symptoms 341
 Dyes eosinates of azures and methylene blue 484
 DYSENTERY
 in Gulf of Guinea 348
 amoebic *see* AMOEBIASIS
 BACILLARY 33-37 319-325 552-554 690-692
 in Abyssinia 348
 China, Peiping, 613
 Caracao 552
 Dutch East Indies, 325
 in Batavian children 198
 Egypt, 691
 India 552
 U.S.S.R. 890
 in children 324
 U.S.A. 690
 control 277
 in mental hospital, 34
 treatment 33 277 552
 bacteriophage 691
 chemotherapy 553 (692)
 nickel pectinate 36 37
 polyvalent bacteriophage 36 325
 serum polyvalent, inefficacy of, 690
 sulphonamides
 sulphadine, 324
 sulphaguanidine 319 320 322
 toxicity of 322
 sulphanilylbenzamide 35
 sulphanilylguanidine 34
 sulphapyridine 36 553
 sulphathiazole 324
 balantidial
 in child, in North China, 33
 diagnosis, endoscopic, 647
 treatment by spiriod 33
 phage in soil, 162
 in women, in tropics, 203
 Echidnophaga gallinacea
 role of in plague transmission 307
 transmitting experimentally endemic typhus, 814
 Echinococcosis *see* Hydatid disease
 Echinococcus granulosus in dogs in Chengtu 627
 Echinoderm injuries in Nauru 498
 Echinostoma lindenbergi 565
 Echinostomes of man, in Dutch East Indies 565
 Echinostomiasis
 in Dutch East Indies, Celebes, 14 629
 Eczema in China, Canton, 217
 Elephantiasis *see* Filarial lymphangitis
 Embadomonas intestinalis infection in Brazil
 Bello Horizonte 5

- Encephalitis**
 in Batavian children, 188
epidemic
 in China, Peking, 613
 diagnosis, differential, from typhus, 754
Encephalopathy lead in Chinese infant, 198
Endolimax nana infection in Brazil, Bello Horizonte, 5
Eubrynia schistose bite of, 408
Entamoeba
col infection in Brazil Bello Horizonte 5
histolytica
 cultivation of 314
 influence of bacterial flora on 768
 cysts
 destruction of 313
 viability of 313
 growth in cultures developed by micro-isolation 28
 like amoebae of monkey morphology of 28
Enterica, in Gulf of Guinea 348
Enteritis, ulcerative caused by *Histoplasma capsulatum* 645
Esterobius
 infection
 in Brazil, Bello Horizonte 5
 Germans returning from Africa, 859
 U.S.A. 191 (782) 877
 appendiceal, 877
 in U.S.A. 634
 relation to appendicitis, 634
 appendicitis and, (709)
 diagnosis, 781
 NIH swab compared with other methods 780
 swab method, 19*
 familial nature of 191
 incidence in U.S.A. population groups 191
 treatment
 gentian violet, 781
 Labias 859
 phenothiazine 192, 781 861
 fatal case, 195
 toxicity of, 464 580
 larvae 709
Esterobius crassicaudatus
 appendicitis and, 19*
 eggs
 buoyancy of, 771
 survival of, 19*
 infection
 in Samoa, 872
 age resistance to, 624
 diagnosis, endoscopic, 647
 genetic constitution and 624
uremosus hominis (?) infection in Brazil, Bello Horizonte 5
Entropion, in China 863
Eosinophilia, extreme in U.S.A. children 483
Epidemic
 anti-work in China, 27*
 dropsy *see* DROPSY EPIDEMIC
Epilepsy
 cysticercosis and, 9*
 treatment by sulphathiazole 563
 treatment by cobra cross 407
Epithelioma of anus, amoebic granuloma *sensu lato*, 317
Erythraeae, in China, Peking, 613
Erythrocytes, Cabot ring bodies of, 766
Espendia, *see* LEISHMANIASIS, mucocutaneous
Euparyphium
skocron 565
maleri nana 565
recreation 565
Euphorbia genus poisoning, 51
Eye diseases
 of Nigeria, 889
 statistics, from Madras Government Ophthalmic Hospital 1939-40 404
F *scrolo hepaticae*
 causing biliary colic, (14)
 eggs in medicinal ox bile 704
 infection, 14
 in Habana, 14
 Tams, 703
 symptoms, 703
 treatment by emetine and 914 703
Fasciolopsis busi infection
 in Indo-China, Tonkin, 13
 Thailand, 564
 in dogs 15
 treatment, 564
Favism, 639
 in Palestine in children, 279
 aetiology 279
 symptoms 279
Ferruhaemate (di-sodium) injections into dogs
 pathological changes, 811
Fever five-day
 symptoms, 154
 treatment by sulphapyridine 154
Filaria of Pacific, nomenclature of 77
Filarial
 lesion of spleen, in India, 707
 lymphangitis
 in India 185 477
 due to lymphopathia venereum 7*1
 incidence seasonal variations, 185
 treatment
 sulphonamides 721
 sulphamylamide and vaccine 186
 surgical, 873
Filariae *see also* Wuchereria, Loa, Onchocerca, Dracunculus, Diofilaria
 in Belgian Congo, 859
 Cameroons 859
 Germans returning from Africa, 859
 Gulf of Guinea 348
 Japan Yary ma Islands 183
 Leeward Islands, St. Thomas and St. Croix Islands, 183
 Newru 571
 Spanish Guinea, 859
 of breast 571
 in children, 183, 186
 complications surgical, 186 188
 control, 277
 prophylaxis, 186
 symptomless, 186
 treatment 277
 sulphapyridine, 571 572
Fish, larva cross, of Tams, (80-4)
Flea, Ecology of, in connection with their Epidemiological Significance (book review) 723

- Fly population
trapping rates, in North China, 650
urban characteristics of 650
- Fungi, predaceous (493)
- Gambusia*
affinis affinis feeding habits of 604
Kolbrooks use of in control of *A. aegypti* 76
- Gangosa syndrome analysis of 39
- Genetic constitution as factor in resistance to
helminth infections 624
- German measles simulating malaria, 255
- Germanin *see also* **TRYPANOSOMIASIS** human
African treatment
(Bayer 205) producing degeneration of adrenal
cortex, 240
- Giardia*
intestinalis
in Brazil Bello Horizonte, 5
Mexico 313
U.S.A. 32, 621
of gallbladder 620
steatorrhea and, 662
treatment 556
atebrin 32, 621
lamblia *see Giardia intestinalis*
muris infection in rats treatment by atebriu,
32
- Glaucoma
in India 404
aetiology 886
treatment, 889
minia
reeding-grounds, seasonal evacuation of,
532
control 443 606 (318)
usma
ovallans
bats as source of food for 234
behaviour of 443 817
control, in Southern Rhodesia 443
physiology of 443 817
- alipalis*
control experiments, in Kenya, 653
var *fulcipis* natural history of 442
- schinoides* bats as source of food for 234
- editis*, nutritional
in Gold Coast, 785
reatment by vitamin B₂, 785
ire endemic
in China, 277 649
- nophylaxis*, 649
potassium iodide, 277
- gylonema*
roplasticum, in rats, in Chengtu 627
- ulchrum* infection
in Bulgaria, 633
relation to cancer 633
symptoms, 633
- indou*
in Spanish Guinea, (41) 460
elation to yaws, 480
- ouloma*
moebic
stimulating epithelioma of anus 317
treatment, 317
if appendix, caused by *T. trichiura* 190
occoloidal, diagnosis, differential from
chromoblastomycosis, 104
inea worm *see* **Dracontiasis and Draconculus**
- Haemagogus** spp isolation of yellow fever virus
from, 68 615 684
- HAEMATOLOGY** 480-483 630-640 716-718
785-787 883-884
- Haematophilus* *inodora* experimentally infected
with *T. cruzi* 247
- Haemoglobinuria* *see under* **BLACKWATER
FEVER**
- Haemolytic* syndrome 639
- Harara in Palestine in Australian troops, 577
- Haverhill fever diagnosis, differential from rat
bite fever 693
- Hay fever tropical
in Dutch East Indies 417
aetiology 417
treatment 417
- Health
Department of Panama Canal, Report 18-40
(573)
influence of climate on, 492
service among rural Bantus, 892
- Heat
acclimatization in man, 351 579
cramps, 579
exhaustion, 579
pyrexia, treatment by lumbar puncture 721
stroke 48 579
at sea, (281)
- Helminth
cysts of brain, diagnosis 568
eggs, embryonated viability of (628)
- HELMINTHIASIS**, 5-16 88-102 182-197 463-
478 660-673 624-635 698-
709 767-784 835-877 *see*
also under names of worms
in Brazil, Bello Horizonte 5
Cull of Guinea, 348
Mato children's hospital, (6)
Tnnia, 473
allergy in, 560
diagnosis, skin tests 560
diet and 624
genetic constitution and 624
in horses, treatment by phenothiazine toxic
ity of 465
natural resistance to 624
Summary of Recent Abstracts, 508-513 583-
589
treatment 6
chemotherapy 350
- Hemp-drag insanity in India, 793
- Hepatitis
in Anglo-Egyptian Sudan, 457
Argentine Tucuman, 415
amoebic pathology 29
symptoms, 415
treatment, 415
- Heterakis* *spumosa* age resistance to 624
- Histoplasma capsulatum*
causing ulcerative enteritis, 645
differentiation from *Leishmania* 645
life-cycle of 106
- Histoplasmosis*
in Brazil in a child 645
Britain, 645
U.S.A. 109 645
aetiology 109
diagnosis, 645
pulmonary in U.S.A. 484

Histoplasmosis—cont

- symptoms, 645
- systemic, 104
- treatment, 109 645

Hookworm

diseases *see* **Ankylostomiasis**

eggs

- simple flotation technique for 463
- Stoll-Hamsher method for counting, 473

Housing of African labourers, 57**Hydatid disease**

- in Australasia, 93
- Chile, 466
- Colombia, (706)
- New Zealand 466 470
- Spain 96
- allergy (771)
- alveolar in New Zealand, 470
- complement fixation in 84
- diagnosis, immunological polysaccharide
- scolex antigen for 93
- immunity (771)
- of kidney 470 (872)
- malignant hypertension and 866
- of lung, (706)
- Ivanovitch's sign, 509 (706)
- peritoneal, 95, 96
- of pigs, in Guatemala, 706
- skin reactions to antigens in, 95
- of spleen, (706) (572)
- infiltrating, diagnosis (473)
- membrane retained, X-ray diagnosis of, 869

Hymenolepis infection *see under* T. p. worms**infection*****Hymenolepis dimorpha* in rats, in Chengtu 627****Hyperglycaemia due to snake venom, 767****Hyperventilation and tetany 48****Immunity against Animal Parasites (COLLATERAL)****work (book review) 355****Impetigo, treatment by sulphoamides 866****Infant mortality beriberi and in India, 530****Inflammation, diplo-bacillary in India, 404****Influenza diagnosis differential, from typhus, 754****Insecticides, 490****pyrethrum powder in Kenya 577****INTestinal PROTOZOAL INFECTIONS, 602*****see also* AMOEBIASIS*****Isospora busckii* infection, in Brazil Bello****Honolulu, 5****Ivy poisoning, (330)****Japanese river fever *see* TYPHUS GROUP OF****FEVERS, mite-borne****Jaundice, in Uganda, 896****Joint-articular nodes in Galt of Guinea 348****Kahn reaction****effect of temperature on, 45****in pinta, 112, 113****Kala azar *see under* LEISHMANIASIS****Keratitis****macular in India, 404****superficial punctate parenchymatous****in U.S.A. 869****treatment, 869****Keratoderma, pinta and, 111****Keratoma in India, 404****Krüper disease, aetiology 722****Labour****conditions, in West Africa, (420)****migrant, in Africa, effects on tribal life, 723****Larva migrans, treatment, 486****Larvicides and *see under* Anopheles, mosquito****comparative value of, 122****phenol, 123****pyrethrum powder in colloidal solution, 122*****Leishmania******hydris* bite of, simulating acute abdomen****409*****macrura* bite of, 410 641 720****Lead poisoning, in Chinese infant, 196****Leech****infection, in China, 486****removal from nose 793*****Leishmania*****action of synthalin on, 239****biochemical reactions, 187****differentiation from *Histoplasma capsulatum*****645*****Leishmania******brasiliensis* cultures, resistance to cold 175*****donovani* natural infection of *P. chinensis*****with, 169*****trypa*****polysaccharide of, 174****transmission by *P. papaver* 174 451****LEISHMANIASIS, 187-178 447-452 537-538****607-611 672-674 746-750****canine****in Brazil 169****China 168****diagnosis formal-gel reaction, 166****skin lesions 169****control, 277****cutaneous *see also* oriental sore****in Brazil 175****São Paulo, 673****Colombia, 174****diagnosis Montenegro skin test, 673****prophylaxis, 175****reservoir hosts of, in U.S.S.R. 538****diagnosis Montenegro intracutaneous rea-****tion 170****kala azar****in Abyssinia, 348, 606****China, 449****Hupé 167 185****Perung, 613****Hungary 673****India****Bihar 448****Calcutta 748****Kanya, 348****in troops 746****Sudan, 694 747****Venezuela, 607****blood lipoid and cholesterol content of, 11****canine****in Palestine, 747****new fraction of a cold-susceptible protein****in blood in 747****complications****agranulocytosis, 606****ocular 171****cutaneous lesion, in bullock, in Assam, 51****diagnosis, 607****complement fixation test, 166, 225****with V.K.K. antigen, 461****Congo red flocculation, 120****differential, 250**

Leishmaniasis—cont.
kala azar—*cont.*
 diagnosis—*cont.*
 serological, 608
 spleen puncture 608
 infantile
 in Spain, 608
 pyelitis and 608
 malaria and relationship between in rural area, 448
 symptomatology 746
 transmission, 447 448 449
 P. chisensis 449
 treatment (including experimental) 608
 antimony 747
 aromatic diamidines 748
 4,4'-diamidino
 diphenyl-ethylene, neurological sequel to 748
 diphenoxypentane 172
 stilbene 172 173
 neostam, 172
 neostibosan 171 450 537 673
 pentide
 and adrenalin, 608
 and blood transfusion, 608
 solustibosan 450
 tartar emetic intravenously 748
 ureastibamine 171
 mucocutaneous (omphalia)
 in Brazil 673 674
 diagnosis, Montenegro skin test, 673
 immunization, 674
 oral pharyngeal
 in Sudan, 749
 treatment by pentamidine 749
 oriental sore
 in Brazil, 609 610
 Canada, 749
 India, Delhi, 173
 Palestine, 749 750
 Sudan, 609
 Turkistan, 610
 U.S.A. 749
 diagnosis, 606
 immunization, 750
L. brasiliensis in apparently intact nasal mucosa, 610
 transmission by *P. papatasi* 451
 treatment, 173
 electrocoagulation, 610
 greasy rays 749
 Summary of Recent Abstracts, 359-365
 treatment, 277
 visceral *see* *kala azar*
LEPROSY 216-233 461-463 557-560, 621-623
 695-698, 766-767 850-858

Leprosy 767
 in Argentine Entre Rios, 218
 British Guiana, 852
 Brazil, 462
 Maranhão 218
 China, 217 893
 Cochin China, 230
 Colombia, 558
 Cuba, 219
 Estonia, 462 (857)
 Gulf of Guinea, 348
 Hawaii, 224

Leprosy—cont.
 in India, 226 696
 Bengal, 557
 Orissa, 216
 Nigeria, 850
 Oji River settlement (233)
 Paraguay, 221
 Peru (219)
 Philippine Islands, 222 223
 Cebu, 216 217
 in child 222
 Porto Rico 219
 South Africa, 232
 Southern Rhodesia, 696
 Sudan 851
 U.S.S.R. 890
 U.S.A. 216 695 698 852
 abortive 558
 acid fast bacilli isolated from case of 221
 atypical 695
 bacteriology of 224
 biochemistry of, 223
 blood in, 224
 groups and 697
 British Empire Leprosy Relief Association
 (Madras) annual report 1940-
 1941 229
 Orissa Branch, annual report 1939-1940
 216
 Campaign against, in Rio de Janeiro (book review) 206
 in children 229 557 558
 of leprous parents 222 558
 control, 622
 complications, 224
 ankylostomiasis 851
 schistosomiasis, 851
 control
 in Brazil Maranhão 218
 British Guiana, 852
 Egypt, El Rangu Settlement, 851
 Nigeria, Uruakli Settlement, 850
 U.S.A. Carville leprosarium 852
 diagnosis
 comparative tests, 226
 complement fixation test, 225
 with W.K.R. antigen, 461
 differential, 224 695
 from blue disease 643
 neuritis 695
 puré-puré, 114
 rheumatism, 695
 sinusitis, 695
 syphilis 695
 tuberculous, 695
 yaws, 849
 histamine skin test, 623
 immunological skin tests, 655
 lepromin test, 696
 Mitsuda reaction 856 857
 Montenegro intracutaneous reaction, 170
 Pieroni test *see* histamine skin-test
 Rubino test, 228
 diet in, 229
 glycosuria in, 224
 hereditary susceptibility to 223
 immunity 558
 infection of white rats with gland juice of leper 853

Leprosy—cont.

- inoculation
 - into hamsters, 621
 - by nasal instillations, 622
 - into rodents, 621
- lepra reaction, (225)
- lepromin test, 226, 227 228 696
 - relation of early reaction to Mitsuda reaction, 227
 - standardization of lepromin, 227
- lesions
 - artificial, 223
 - vascular, 223
- leproid rash in yaws, 29
- Mitsuda reaction *see* lepromin test
- Muir's potassium iodide test in, 696
- nerve, 224
 - treatment by carotene, 559
- nerve, 217 218 657
 - treatment, diphtheria toxin, 231 697
- nerve changes in, 222
- perforating ulcers of foot, treatment, 622
- of phalanges, treatment, 559
- prophylaxis, *Hydrocarpes anthelmintica* oil, 230
- in rats *see also* *Mycobacterium leprae* strain
 - development from human leprotic material, 221
 - treatment, experimental, 233
- sera, complement fixing power of, 220
- Summary of Recent Abstracts, 729-736
- surveys, in India, 851
- transmission
 - to hamsters, failure of, 864
 - role of *Amphymonas caryocarpus*, 855
- treatment, 216, 224, 229 462, 657 (657)
 - chaulmoogratia, 218
 - analyses of, 229
 - chaulmoogryl choleins, pharmacology of, 230
 - diphtheria toxin, 232, (233) 462 697 698
 - limitations of, 231
 - Hydrocarpes anthelmintica* oil, 230
 - urthra oil, 651
 - skin grafts, 659
 - synthesis of drugs, (696)
 - vaccines, 696
- tubercloid
 - nerve caecation in, 222
 - nerve and, 222
 - tuberculous and, 225
 - Wassermann reaction in, 224
 - W K K antigen, use of, 225
- Leptospira icterohaemorrhagiae* cultivation, in
 - low embryonic tissue, 127
 - 124-125, 346-347 847-850
- in Africa, 847
- Assam, 347
- Dutch East Indies, Java 347
- India, Bombay 346
- aetiology 129
- complications, meningitis 125
- diagnosis 848
- treatment, 125
- Leucemia, acute lymphatic, noma and, 411
- Leucocytosis, in children, in U S A 453
- Lewis's Medical and Scientific Library Catalogue Supplement 1938-1941*
 - (book review) 799

Liver

- abcesses *see under* AMOEBIASIS
- changes, in malaria, 519
- cirrhosis
 - in China, 893
- infantile
 - in India, 415
 - aetiology 415
 - pathology 415
- diseases
 - in Uganda, 896
 - diagnosis, Congo red flocculation, 129
- Los Ios
 - in Gabon, 870
 - German, returning from Africa, 859
 - Sudan, 168
- Loeffler syndrome and amoebiasis, 792
- Lymph, Government Establishment, and Pasteur Institute 1891-1940 of Dutch East Indies, (484)
- Lymphadenitis, granulomatous, caused by *H. bancrofti* 571
- Lymphogranuloma inguinale
 - in Abyssinia, 348
 - Gulf of Guinea, 348
 - U S A Georgia, 50
 - diagnosis, 418
 - untreated, spontaneous healing in, 50
- Madras Government Ophthalmic Hospital statistics of eye diseases 1936-1940 404
- Madras foot
 - in Argentina, 167
 - Gulf of Guinea, 348
 - diagnosis, differential, from chromoblastomycosis, 164
- MALARIA, 16-27 116-124 176-182, 350-263
 - 290-300 367-401 477-441
 - 513-625 592-605 683-670, 736-743 806-815
- in Abyssinia, 17 348, 361
- Albania, 368 438
- in Italian troops, 601
- America, North, (292)
- Argentina, 115 292
- Corrientes Province, 437
- Assam, 177 180 251 435 598
- Belgian Congo, 663
- Brazil, 739 813
- British Guiana, 204
- British Honduras, 296, 430 736
- Bulgaria, 602
- Cameroon, 663
- Caribbean area, 436
- Ceylon, 663
- Chile 427
- China, 388, 693
- Hanan, 251
- Peking, 613
- West Yunnan, (177)
- China-Burma highway 277
- Colombia, 809
- Costa Rica, 290 291
- Cuba, 513 614 616
- Dahomey 663
- Dutch East Indies, 254 599
- Federated Malay States, 258
- Selangor 182
- French Guinea, 663

Index of Subjects

aria—cont

in Gabon 663 870
Gold Coast 663
Guatemala 430
Gulf of Guinea 348
India, 251 393 437 808
Bihar 448
Coorg 895
Delhi 259
Orissa, 299
Indo-China 180
Tong Sontay Region 177
Italy 22

Lower Volturna, 18
Po Delta 262

Ivory Coast 663

Kenya 595

Liberia, 663

Macedonia, 389

Manchuria 663

Mexico 430

Nigeria, 663

Palestine 592

Philippine Islands 523

Portuguese Guinea, 663

Sardinia 19 23

Senegambia, 663

Sierra Leone 663

Sedan, 666

in troops, 255

Swanland 809

Togo 663

Trinidad 664

Uganda, 391

U.S.S.R. 516 517 518 520 860

in the Pamirs 250

U.S.A. 388 395 400

North Carolina, 387

Tennessee Valley 436

dominal syndrome in 521

Ivory Board, Federated Malay States,

annual report 1940 258

glutination reaction in experimental

animals 741

lema and, 19

an

in Brazil, 400

in canaries, inoculation of, with sporozoites

from isolated oocysts 742

in ducks treatment by sulphonamides, 441

experimental, 440

immunity passive in, 27 605

produced orally 399 400

treatment

atebrin 439

changes following, 439

chemotherapy 299

hydroxyethylapocypreine 124 396

prontosil 27

biological resistance to 738

blackwater fever and 666

blood in 173 273

rise in sedimentation rate 393

sugar and, 299

cardiac 297

cerebral 432

in India, 383

diagnosis, differential 432

pregnancy and 297

Malaria—cont

cerebral—cont

treatment, 432, 739
in children 17 513 514 515 518 520
in U.S.S.R. 520

diagnosis, 518
nephropathies in, 520
symptoms 518

chronic 516

complications

cardiac 813

cerebellar 432

pneumonia, lobar 519

pulmonary oedema, 518

trophic disturbances, 517

congenital 518 599

in U.S.S.R. 518

control and see prophylaxis 277 (397) 521

in Assam 180 435 603

Bulgaria, 602

Ceylon, 603

Costa Rica, 291

India, 259 603 667 668

Kenya, 396

Palestine 592

Southern Rhodesia, 260

U.S.S.R. 890

U.S.A. Tennessee Valley 261 262,

436 740

by Anti Mosquito Measures, 2nd edition

[Covell] (book review) 205

bonification, 438

drainage 291

glassfishes (*Ambassis* spp.) in relation to 633

obstacles to 603

in ricefields, 299

role of Red Cross 115

among troops 180

diagnosis 431 739

artificial melanin (256)

basophilic granulation, 520

complement fixation test, 118, 119 255 256

Congo red flocculation 120

differential 250

flocculation (256)

Henry's reaction 121 256

Oda Arai test 120

protein tyrosin reaction, 298 600

serological 120 394

thick blood films, 254

economic problem of 808

effect of on syphilitic tests, 665

excretion, urinary of urobilin and indican, 298

haematinemia in 273

Henry's reaction, 121 256

at high altitudes, 250

Human, symposium on (book review) 483

immunity 738

In Rhesus monkey 524

incubation period prolonged in tertian infec-

tions, 431

in infants 251

kala azar and, relationship between, in rural

area 448

liver

changes in 519

damage in, 298

malnutrition and, 262

maternal mortality and, 203

Malaria—cont

- meningococcal septicaemia resembling, 733
- in merchant seamen, 176
- metabolism in, 518
- mortality in U.S.A., 383
- mosquito breeding in mud-lobster holes, 814
- parasite indices in infants, utility of, 231
- paroxysm, rôle of pigment in, 604
- perniosis, 293
 - in Brazil, 293
- pigment, compared with that of schistoso miasis, 564
- and *Plasmodium* relationship between, 437
- Plasmodium* ovar infection
 - of anophelines simultaneously with two strains of, 431
 - varying infectiousness of patients with, 429
- pregnancy and, 297, 518
- prophylaxis, 176, (397) 435, 736
 - drug control, (122)
 - adrenalin, intravenously (Ascoli's method), 23
 - atebrin, 250, 306, 523
 - complications, 434
 - 313, 179
 - failure of, 259
 - plasmaquine in *falciparum* infection, 182
 - quinine, 602
 - complications, 434
 - with rash, 253
 - relapses, 431
 - treatment, 121
 - renal damage in, 299
 - research, (436)
 - review of, 115
 - reticulo-endothelial system in, 118
 - rice-fields and, 293, 299
 - sepsis simulating, 394
 - simulating German measles, 255
 - spleno-megaly bone marrow in, (254)
 - still-births and, 203
 - Summary of Recent Abstracts, 129-137, 207-216
 - survey in China, West Yunnan, (177)
 - syphilis and, 357
 - symptoms
 - atypical, 813
 - rash, 531
 - toxic, possible rôle of ferrihaemate acid in production of, 811
 - therapeutic, 20, 255
 - in U.S.A., 433
 - absence of incubation period of, 21
 - erythrocytic schizonts in, 263
 - fatal complications, avoidance of, 433
 - intramedullary inoculation, 392
 - and natural malaria, comparative observations, 601
 - oedema in, 603
 - paroxysms in, 600
 - relation of hypoaalbuminaemia to oedema in, 605
 - treatment
 - neocarbazamine, 121
 - quinine, 603
 - sulphathiazole, 601
 - transmission by blood transfusion, 232
 - treatment, 16, (22), (122) 176, 277, 736

Malaria—cont

- treatment—cont
 - adrenalin, intravenously (Ascoli's method), 22, 22, 601
 - atebrin, 21, 517, 739
 - heavy dosage, 696
 - atociclic, 178
 - atebrin and biochemol, 517
 - atebrin and plasmaquine, 606
 - atebrin mononate, 608
 - berberine, 250
 - cardiacol, 250
 - drugs
 - effect on respiration of *Plasmodia*, 397
 - short course, 813
 - testing of in Warburg manometer, 742
 - Iamar, 22
 - Italcium, 433
 - mapharin, 256
 - oral and plasmaquine, 250
 - plasmaquine, 21, 517
 - intravenously experimental, 436
 - Promin, 306
 - quinine, 21, 121, 182, 362, 516, 521, 739
 - clinical findings following, 121
 - economy in, 739
 - ineffective, 120
 - intramuscularly, 266
 - purpura haemorrhagica following, 257
 - thrombopenic purpura following, 257
 - quinine and methylene blue, 513
 - quinine-methane, 606
 - quinobion, 179
 - Review of Some Recent Papers, 601-606
 - same, 179
 - sulphadiazine, 365
 - of troops, 21
 - typhus fever and comparative morbid anatomy, 367
 - Wassermann Reaction and, 119
 - Malnutrition
 - anaemia and, in Indian tea garden coolies, 418
 - malaria and, 282
 - Maternity in Tonkin, 57
 - Mosales
 - in Gulf of Guinea, 345
 - diagnosis, differential, from typhus, 734
 - Medical
 - training of natives, in Tanganyika, (663)
 - work, in Nauru, (351)
 - Medicine
 - native, African, (493) (book review), 724
 - Tropical, 4th edition [Rookes & Mearns] (book review), 282
 - Aids to 4th edition, revised [Bailey] (book review), 357
 - History of, 2nd edition [Scott] (book review), 798
 - recent progress, (278)
 - Western, Chinese Lessons to (book review), 728
 - Meloidae* poisoning, 51
 - Meloidosis, transmission by
 - Meloidae argyrea*, 578
 - M. chaptaliae*, 578
 - Meningitis
 - in Bahavian children, 196
 - cerebrospinal, diagnosis, differential, from typhus, 754

- Meningitis**—*cont.*
 as complication of leptospirosis, 128
 diagnosis, differential 250
 epidemic in China, Peiping, 613
 Torula, 104
 tuberculous, diagnosis 188
- Meningo-encephalitis** in Chagas disease 671
- Meningococcal septicæmia** resembling malaria 738
- Mercuric chloride** as preservative of cyanogenetic plants for chemical analysis, 419
- Metabolism** basal, in tropics determination of 797
- Microtus ervahi** migrations of, (303)
- Milk, human, vitamin B₂** content of 333
- MISCELLANEOUS**, 47-58, 187-204 277-281
 348-351 410-420 484-493
 575-579 646-653 721-723
 791-798 890-900
- Monkeys, Colombian**, as reservoirs of tropical diseases 791
- Monosporium apiospermum** causing Madura foot, 107
- Mortality** maternal
 malaria and, 203
 neo-natal and infant in Tonking, 57
- Mosquito Abatement District Alameda County**
 annual report 1940 (35)
- Mosquitoes**
 of Mocambique, 350
 bites treatment by chloroform, 350
 black spores and brown degeneration " of microfilaria in 117
 breeding
 in mud lobster holes, 814
 static waters supplies 794
 collection of on board ship 809
 control 521
 in Sierra Leone 814
 in aircraft, 458
 fish breeding 76
 finning 814
 house-proofing, 281 282
 insecticides, Pyrethroids 20 180
 larvicides
 chlorophanol, 603
 comparative value of, 122
 copper sulphate 181
 ocimum oils 260
 phenol, 123
 pyrethrum
 increasing toxicity of 491
 powder in colloidal solution, 122
 slaiking, 814
 trapping, 350 515
 use of solidified carbon dioxide in developing pressure for spray killing, 181
 salivary glands dissection of 809
 yellow fever-carrying 72
- Mycetoma** in Brazil 107
- Mycobacterium lepræ**
 alteration by fixation agents 855
 behaviour in complex liquid media 220
 demonstration of by fluorescence microscopy 767
 inoculation of into monkey 221
 isolation of protein antigen of 855
 separation of from leprous tissue 766
- Mycobacterium lepræ murium** action of oils on 857
- Myelitis** caused by *S. mansonii* 466, 628
- Myiasis**
 in India, 578
 due to
Cochliomyia hominivorax complicating cancer of lip (350)
 intestinal, in Southern Rhodesia, 443
 urinary in U.S.A. 492
- Myiasis-producing Diptera** in man 578
- Myositis, tropical**
 in Gulf of Guinea, 348
 ætiology 894
- Nanukayami disease** in Java, 347
- Native African Medicine** with special reference to its Practice in the Mano Tribe of Liberia (book review) 724
- Necator infection** see under Ankylostomiasis
- Necator americanus** daily egg output in early infection with, 98
- Nematodes** burate observations on vertical migrations of infective larvae of, 97
- Nephrosis and ankylostomiasis** 707
- Neurasthenia, tropical** 797
- Neuritis**
 diagnosis, differential from leprosy 695
 optic in pellagra, 711
 peripheral, adenyhic acid 574
 relapsing fever and, 556
 in tuberculous leprosy 222
- Neurologic diseases**, in Gulf of Guinea 348
- Nicotinic acid** estimation of
 in animal tissues and blood, (336)
 in biological materials (336)
- Nippostrongylus muris** infection, age resistance to, 624
- Noma**
 in Philippine Islands, 411
 Sierra Leone 411
 and acute lymphatic leucæmia 411
 ætiology 411
 prophylaxis, 411
 treatment 411
 formaldehyde 411
 gentian violet, 411
 sulphonamides, 411
 inefficacy of, 411
- Nomenclature** zoological, 777
- Noesopysyllus fasciatus** distribution, 306
- Nutrition**
 of African labourers 56
 in Federated Malay States, 327 (328)
 Tanganyika, 325 326
 deficiency in appearance of tongue in 890
- Oedema** distribution of, 260
- Oedema**
 nutritional, in children 877
 pulmonary and malaria, 516
- Onchocerca volvulus** transmission by certain arthropods, 778
- Onchocerciasis**
 in Gulf of Guinea, 348
 Mexico 572
 control 277
 ocular ætiology 403
 treatment, 277

- Ophthalmia, gonorrhoeal, treatment by sulphamizide and milk, 402
- OPHTHALMOLOGY TROPICAL**, 401-404 826-890
- Oriental sore *see under* **LEISHMANIASIS**
- Orytholobus*
moschata
 destruction of, 847
 distribution in South Africa, 343
 penetration of *Pyrethrum* through cuticle of, 69
- parkeri*
 in U.S.A. Utah, 344
 vector of relapsing fever in California, 556,
- parvula*
 in U.S.A., New Mexico, 343
 male, characteristics of, 125
- Oroya fever
 control, 277
 treatment, 277
- Osteomyelitis in Gulf of Guinea, 348
- Ostertagia circumcincta* infection, genetic constitution and, 624
- Oxyuriasis *see* Enterobius infection
- Paragonimiasis 12
 treatment, experimental, by proctosed and emetine 13
- Paragonimus* *arcuatus* in cats in Chengtu, 627
- Parasites
 Animal, Immunity against (CLOUTIER) (book review), 335
 of dogs, cats and rats of China, Chengtu, 627
 influence of host constitution on, (331)
 intestinal, Fast zinc sulphate concentration method for, 858
- Parasitology Clinical, 2nd edition (CHAM & FAIR) (book review), 58
- Paratyphoid fever
 in China, Peking, 613
 U.S.S.R., 860
- Pasteur Institute and Vaccine Institute of Dutch East Indies, 1891-1940 (791)
- Pasteurella pestis*
 avirulent, antipenic qualities of, 311
 bacteriological characters of, 687
 metabolism of, 301
- Pathology Text Book of, 5th edition (VIR) (book review) 253
- PELLAGRA AND ALLIED CONDITIONS**, 334-339
 in Argentina, 784
 Chile, Santiago 710
 India
 Balasore State 879
 United Provinces (711)
 Italy 708
 Northern Ireland, 335
 Tanganyika, 325
 U.S.A. 333, 636
 absorption of galactose from gastro-intestinal tract, 334
 aetiology 637
 atypical, 879
 and avitaminosis of B₃-complex group compared, 4-8
 blood and plasma, ascorbic acid concentrations in, 335

- Pellagra and Allied Conditions—cont.**
 famulal, 880
 histopathology of skin in, 880
 infantile
 in Belgian Congo, 639
 symptoms, 636
 intestinal tuberculosis and, 638
 neuritis, optic in, 711
 treatment by thiamine hydrochloride 711
 symptoms, ocular 403
 treatment, 679 680
 adenylc acid, 574
 Nicotinic acid, 636
 nicotinic acid, 710 711
- Pemphigus in Nova Goa, 278
- Peritonium ball in stomach, 487
- Pharmacopoeia, Extra, 22nd edition (MARTIN, DALE) (book review) 59
- Phenothiazine poisoning, 465 864
- Phlebotomus spp.
 of São Paulo, (611)
 blockage of oesophagus of, 447 449
 Chinese (189)
 rôle of, in Carrion's disease, 831
 and verruga peruviana, (830)
- Phlebotomus*
chiracensis, natural infection with leishmania 189
intermedius, biology of, (611)
major infected with *L. brachyura*, 609
papillae control by lethane and pyrethrum 900
peisoni infected with *L. brachyura*, 609
schultzei biology of, (611)
- Physiology
 influence of climate on, 49^a
 of Small Intestine its Application to the Aetiology of Sprue (critical review), 497-508
 of tropical climates, 351 579
- Physoplas globosa*, intermediate host of Schistosoma, 11
- Pig-worm infection *see* Enterobius infection
- Pinta
 in Cuba, 110, 111
 Ecuador (111)
 Porto Rico 110
 Venezuela, 109
 aetiology 109 110 454 642, 799
 control, 277
 diagnosis differential, from blue disease 112, 643
 keratoderma and, 111
 treatment, 110 777
 Wassermann, Kahn and Proskau reactions in 112, 113
- Pisina strachoti*, and malaria, relationship between, 437
- Platyrrhynchus venacolor* diagnosis, differential, from pork parv, 114
- PLAGUE**, 300-312, 549-552, 616-617 687-689 762-784 834-836
- Plague 549
 in Argentina, 303, 309 762, 783
 Brazil, 306, 495, (551)
 Burma, 277
 Canada, 303
 Dutch East Indies, Java, 552
 Ecuador, 303

Plague—cont

- in India, 300 836
 - Kenya, 687 836
 - Paraguay 303
 - Peru 303
 - South Africa, 302
 - U.S.S.R. 880
 - U.S.A. 303 782
 - Uruguay 687
 - atypical, 688
 - Bubonic in North East Brazil (book review) 495
 - complications, pulmonary 689
 - control, 277
 - in Argentine 783
 - China, 277
 - Dutch East Indies, Java 552
 - flame throwers in 312
 - diagnosis
 - differential from tularemia 687
 - laboratory 688
 - post mortem 689
 - in rats serological test for 300
 - ecology 834
 - immunization, 302, 687
 - vaccine
 - live 312
 - living Tjiwadej 309
 - production of 300
 - pathology 687
 - prophylaxis
 - laboratory procedure in 551
 - live vaccine 311
 - rat fleas of British Colombia, 306
 - rodent and burrow flea populations comparative study of 618
 - Summary of Recent Abstracts 421-427
 - sylvatic
 - in Argentine, 305
 - U.S.A. 549
 - transmission studies, 618
 - transmission
 - aircraft, control of, 763
 - role of
 - burrowing owl, 307
 - stocktight flea (*Echidnophaga gallinacea*) in, 307
 - treatment, 277
 - chemotherapy (308)
 - research on, 300
 - new value of, 836
 - serum, 687
 - sulphonamides 300 308 309 687 836
 - vaccine, (688)
 - living, essential characters in strains used for 763
- Plasmodium falciparum* biology of, 8
- Plants
- cyanogenetic, mercuric chloride as preservative of, for chemical analysis 419
 - poisoning by 51 52, 53 200 880 900
- Plasmodia
- development of 123
 - exoerythrocytic schizogony of 24 263
 - in fresh blood films, 17
 - respiration of, 397
 - sporozoites, development of 390
 - staining, in thick blood films 17

Plasmodium

- cathemerium*
 - clon of, compared with parent strain and those derived by mosquito transmission, 124
 - respiration of, 397
 - respiratory metabolism of during developmental cycle 742
 - sporozoites, development in warm-blooded animals 743
 - circumflexum* single-parasite infections and exoerythrocytic schizogony in 440
 - cynomolgus* respiration of 397
 - falciparum*
 - contracted with *P. perniciosum* 293
 - and *P. malariae* mixed infection, atypical gametocytes in, 18
 - gallinaceum* (400)
 - Culex quinquefasciatus* as vector of (440)
 - endothelial stages of origin of 26
 - exoerythrocytic
 - cycle biological significance of 668
 - developmental form of, origin of 25
 - forms 524
 - stages of behaviour of, 669
 - extra-erythrocytic forms continued passage in absence of erythrocytic schizogony 524
 - failure to infect fowls orally with 670
 - immunization active of fowls against, 300
 - passive of fowls against 27
 - natural host of 670
 - production of plasmoquine-resistant strain of, 815
 - sporozoites inactivated specific agglutino-genic properties of, 300
 - trui* respiration of 397
 - justinucleare* n. sp.
 - knownless
 - pigment of 438 741
 - role of in production of malarial lesions, 741
 - respiration of 397
 - lophurae*
 - infections, in chickens, effect of carbon ink injections on, 441
 - respiration of, 397
 - sporozoites, in *A. quadrimaculatus* 295
 - survival *in vitro* 440
 - transmission by mosquito (525)
 - malariae* and *P. falciparum* mixed infection atypical gametocytes in, 18
 - ovale* infection
 - in China, 388
 - Colombia, 609
 - India 251
 - Swanland, 809
 - like parasite in Filipino blood 118
 - perniciosum* infection, 293
 - vivax* reticulocytes infection of, 812
- Plummer Vinson syndrome and riboflavin deficiency 338
- treatment, riboflavin, 337
- Pneumonia
- in China, Peiping 613

Pneumonia—cont
diagnosis
Congo red flocculation, 120
differential 250
from typhus, 754
lobar and malaria 519
Pneumonia in experimental Q fever 320
Poisoning
carbon tetrachloride 631
djenkol 490
vr (350)
lead, in Chinese infant, 196
phenothiazine 465 864
plant 51 52 53 200 809 900
sumac, (350)
Poisonous plants of South Africa 51 200 809 900
Poliomyelitis in China Peiping, 613
Polyarthrits rheumatic in Gulf of Guinea, 343
Polysentitis
in Trinidad, in oil workers, 323
and arthritis in typhus 54*
Pregnancy
anaemia and in Calcutta 783
cholera and, 690
malaria and, 297 518
Prickly heat
aetiology 645
treatment, 648
Proctodermatous error 770
infection, in Egypt 770
Prole reaction, in pusta 11.
Protozoa
cultivation of, (49*)
intestinal
in Brazil Bello Horizonte 5
Moroccan school children 619
U.S.R. 890
detection of 85
experiments in U.S.R. 533
among foodhandlers, in Philadelphia 654
treatment, chemotherapy 350
Protozoal infections
chemotherapy of (173)
complications, surgical 315
Pule irritans distribution 306
Pulmonary diseases in Gulf of Guinea, 343
Parpara
malarial, 257
thrombopenc, 257
Parâ-Parâ
aetiology 114
diagnosis, differential from
chambers 114
leprosy 114
pityriasis versicolor 114
syphilis 114
tinea alba, 114
mpra, 114
tokolax, 114
vitiligo 114
vava, 114
synonyms of, 114
treatment, 114
Pyelitis in infantile kala azar 608
Pyoverdine, 863
Pyrethrum flower toxic principle of, 900
Q fever see under TYPHUS GROUP OF FEVERS

RABIES, 79-86 589-592
in Assam, 83
Brazil, 83
China, 83
Peiping, 613
Tunis, 590 591
Turkey 84
U.S.A. 591
control
in Hungary 85
South Africa, 86
diagnosis, 590
errors in, 590
immunity
experiments, 87
tissue factors in, 81
immunisation, 82
of dogs 84
in Tunis 591
U.S.A. 591
paralytic
in Venezuela, 87
accidents 84
pseudorabies of Ajayasky experiments, 81
research, (362)
symptoms, mesencephal, 589
treatment 591
Fern s accine 83
paraplegia following 591
Simple method, 83
statistics Peiping Union Medical College 83
rabies
commercial 590
elimination of excess nerve tissue from, 590
tris
cross immunity tests, 586
fixed cultivation on developing chick
embryo characteristics of, 79 80
irradiated tissue culture 82
street cultivation rats, 589
RAT BITE FEVER, 1 4-128 345-348
in Dutch East Indies, Ambone, 177
French Equatorial Africa, Brazzaville 345
U.S.A. 127 693, 694
diagnosis, 693
differential from haverhill fever 693
due to *Streptobacillus moniliformis*, 693
experimental, Weil-Felix reaction in, 345
in infant 177
treatment by neocorphenazine 694
Rats extermination of (308)
Raynaud's phenomenon 297
Red palm oil, production of, 227
Reduced body reactions of man to feeding of 671
RELAPSING FEVER, 1 4-128, 342-345 656-657 692-694, 846-847
in Abyssinia, 343, 836 846
Anglo-Egyptian Sudan, 457
China, 277 613
Libya, 846
South Africa, 343
Spain, 342
Tanganyika, 125
Tunis, 342
U.S.R., in the Pamirs, 250
U.S.A. 343 344 356

- Relapsing Fever—cont
 cerebrospinal fluid in 125
 control, 277
 diagnosis, 846
 disinfection in 142
 due to *S. carteri* 250
 experimental
 in Chinese hamsters chemotherapy 126
 treatment by sulphonamides 693
 louse-borne spirochaetes growth of in chick
 embryo 124
 neuritis and 556
 prophylaxis 142
 symptoms 556
 treatment, 125 277
 arsenic failure of, 846
 gold compounds experimental, 344
 N.A.B. 846
 Neosal 556
 neo-solganol in T.C. 6 344
 sulphonamides experimental, 344
 vitamin K 846
 RESEARCH SECTION 580-582 653-654
 Retinitis pigmentosa in India 404
 REVIEWS AND NOTICES 58-80 205-208 231-
 234 352-358 493-496 723-
 728 798-800
 Rheumatic fever in Gulf of Guinea 348
 Rheumatism
 in Brazil, 898
 tropics and sub-tropics, 898
 diagnosis differential from leprosy 695
 Rhinocleroma
 in Dutch East Indies Java, 648
 India, Vizagapatam 199
 treatment, 199 648
 Rhinopneumonitis
 in India, Bombay 413
 Uganda, in native 413
Phlebotomus sanguineus transmitting tick
 borne typhus, 757
 under TYPHUS GROUP OF
 FEVERS
 Rickettsial diseases of Dutch East Indies (146)
 if Valley fever pathology relationship to
 yellow fever 450
 yellow fever interdigital treatment, 102
 GROUP OF FEVERS tick
 borne
 review) 205
 Aeromonas fragilis infection, 106
 flies, sterility and potency of 106
 flies, control by trapping, 350
 fly fever
 in India Peshawar District, 155
 U.S.S.R. 890
 gnots differential, 250
 ptoms, 155
 tion
 d-hole absorption pits 349
 nd water pollution 410
 baga spp. causing intestinal myiasis, in
 Southern Rhodesia, 443
 in China, Canton 217
 fever
 na, Peiping 613
 S.R. 890
- Schistosoma
 intermediate hosts of control by malachite 11
 Schistosoma
 japonicum
 causing appendicitis, 468
 eggs
 development in tissues of host, 700
 life of in tissues of host, 700
 organ localization of in experimentally
 infected monkeys 467
 mansoni
 Australorbis glabratus as intermediate host
 of in Venezuela 866
 Bufo marinus as vector of 361
 causing appendicitis, 465
 myelitis 468 628
 eggs search for 698
 intermediate hosts of 563
 in intestinal lumen, 465
 sexual development of 561
 in vitamin A-deficient white rats 562
 Schistosomatus pathloopticum n. sp. 769
 Schistosoma dermatitis
 in U.S.A. 12 567
 control 567
 Schistosomiasis 465
 in Belgian Congo in young children 624
 Brazil Minas Gerais, 700
 China Yunnan (11)
 Germans returning from Africa, 859
 Philippine Islands 11 468
 Southern Rhodesia 11 699
 Tunis, 768
 Venezuela, 465
 age resistance to 624
 of appendix
 pathology of, 628
 relation to appendicitis 628
 cancer and 10
 complicating leprosy 851
 control, 277
 in Philippine Islands, 468
 malachite 11
 diagnosis 699
 skin tests 560
 involving brain, 11
 myelitis Negri like bodies in 628
 pigment compared with that of malaria
 594
 prophylaxis 468
 rectal, 10
 salpingitic, 10
 symptoms 465 468 699
 treatment, (11) 277 465
 antimony 10 699
 emetine hydrochloride 468
 fouadin 11 468 859
 tartar emetic, 859
 Schistosomiasis haematobium
 in Gabon, in traveller 870
 treatment by anthelmintics 768
 Schistosomiasis intercalatum
 in Gabon, 870
 symptomatology 870
 treatment, 870
 Schistosomiasis japonicum
 in Dutch East Indies, Celebes, 628
 Philippine Islands 468 467
 treatment by fouadin, 467

- Trichinosis*—*cost*
trachinosis—*cost*
 infection
 in Brazil, 473
 Haiti, 473
 Santo, 472
 U.S.A. 858
 Venezuela, 463
 diagnosis
 endoscopic, 647
 skin tests, 660
 vulva eggs buoyancy of, 771
- Trombicula brevis*, treatment by chloroform 350
- Tropical*
 climates, physiology of 361-579
 diseases
 Colombian monkeys as reservoirs of, 791
 Stitt's Diagnosis, Prevention and Treatment 6th edition, [Stitt] (book review) 353
 of Witwatersrand (48)
 Medicine 4th edition, [Rogers & Mixow] (book review) 282
 Add to, 4th edition revised, [Brook] (book review) 357
 History of, 2nd edition, [Scott] (book review) 798
 natives health of 848
 ophthalmopathy, 767
- OPHTHALMOLOGY** 401-404 866-869
 and Sub-Tropical Diseases (book review) 726
- ulcers *see* Ulcers, tropical
- Trypanosoma*
crux
 age resistance of mice to 607
 distribution, in Southwestern U.S.A. 244
 infecting
 experimentally
 H. indora 247
 puppy cardiac capillary changes: 672
 Trypanosoma carassii 671
 naturally
 A. longirostris 247
 dogs in São Paulo 248
 Trypanosoma 443 536 606
 multiplication of, in peripheral blood, by successive passages through mice 748
 natural hosts of in Venezuela, 245
Trypanosoma evansi as intermediate host of 536
- gambusia*
 neurotropic manifestations of in mouse 234
 posterior nuclear forms, in West African strains of, 605
- rhodesianus* resistance of, to chemotherapy 533
- rypanosomus*
 of Colombia, (247)
 action of synthetin on, 239
 biophosphatase function of, 233
 distribution of 4-4-diamidino stilbene in, 238
- TRYPANOSOMIASIS**, 233-249 442-447 532-537 605-607 671-672, 743-746 815-821
- animal
 bovine
 in Southern Rhodesia, 443
 immunization, 242
 treatment, chemotherapy 239
 4-4-diamidino diphenyl pentane, 533
- Trypanosomiasis*—*cow*
 human, African (sleeping sickness)
 in Bechuanaland 236
 Belgian Congo 816
 Cameroon, 743
 French Equatorial Africa, 237
 French West Africa, 444 744
 Gold Coast, 532
 Nigeria, 443
 Portuguese West Africa, 605
 Spanish Guinea, 348 460
 Tanganyika, 818
 Togo, 744
 Uganda, 442
 classical picture, 236
 control
 Anchovy Settlement Scheme, 241
 game destruction, 242
 diagnosis, sero- 237
 remission, 237
 rhodesianus pathological findings, 235
 service in Brazzaville 237
 treatment
 azo-arseno-benzol 4187 444
 Bayer 205 (Germann) 236
 failure of in late stage of infection, 818
 follow-up of cases, 534
 degeneration of adrenal cortex follow ing, 240
 (serum) biological standardization of 534
 chemotherapy 743
 4-4-diamidino-diphenyl pentane, 532
 stilbene toxicology of, 743
 triarsine-arsenic acid, (819)
 trypanazole 237
 artificial following, 241
 untreated, 236
- human, American (Chagas disease) (249)
 in Argentina, 246, 249 445, 536
 Corrientes Province 244
 Brazil, São Paulo, 247
 Chile 246
 Colombia 820
 Costa Rica, 606
 U.S.A. South western States, 244
 Uruguay 536
 Venezuela, 245 746
- etiology 246 248
 in children, 246, 536
 diagnosis, sero- 245 246, 746
 haematogenous chagomata, 246
 meningo-encephalitis in, 671
 treatment by Bayer 7602, 671
 pathology of (537)
 symptoms, Romana's sign, 249
 temperature 446
 treatment (246)
 Bayer 7602, 620
 without Romana's sign, (672)
 Summary of Recent Abstracts, 235-280
- Tsetse flies* *see* Glossina
- Tsetse* flies *see* Glossina
- TYPHUS GROUP OF FEVERS**, mite-borne
- Tuberculosis
 in China, 803
 Gulf of Guinea, 348

Tuberculosis—*cont.*
diagnosis

- Congo red flocculation 120
- differential from leprosy 695
- intestinal, and pellagra, 636
- joint in Gulf of Guinea 348
- leprosy and, 225
- primary diagnosis, differential 250
- Silicosis and among Mine Workers in the Gold Coast, Interim Report on Prevalence of [MURRAY & CROCKETT] 580
- and sprue syndrome (637)
- verruca cutis diagnosis differential from chromoblastomycosis 104

Tularaemia

- in Canada, 201
- U.S.S.R. 890
- diagnosis differential from plague 687

Typhoid

- bacilli in Bandoeng sewerage 197
- fever

- in China, 613 893
- Singapore 48
- U.S.S.R. 890

- amoebiasis and 843
- complications 48

diagnosis

- Congo red flocculation 120
- differential 250
- from trench fever 758
- typhus 754

- ecoumpenia in, 48
- phage in soil 162

- pseudo- in Ceylon, 414

treatment

- antiserum 48
- pyrimidin 843
- sulphonamide 48

TYPHUS GROUP OF FEVERS, 137-157 365-387
452-454 538-548 611-615
674-682 750-759 821-831

- in Algeria, 611

- Assam, 147

- Chile 752

- China, Peking 613

- Dutch East Indies (146)

- Germany in Russian prisoners of war 811

- Middle Europe 841

- Morocco 811

- Poland, 452

- Spain, 611

- Tunis, 611

- U.S.S.R. 890

aetiology 612

- antibodies, time of appearance of 674
- control 828

- in China, 277

diagnosis 612

- complement fixation 539
- differential, 250

- Proteus test, 678

- endemic typhus (including murine) in Abyssinia 348

- Burma 614

- China, 144 277

- French Equatorial Africa 375

- India, Mysore 375 827

Typhus Group of Fevers—*cont.*

- endemic typhus (including murine)—*cont.* in Nigeria Southern 756
- North Africa, 823
- Philippine Islands, 376
- U.S.A.

- Georgia, 377

- Tennessee 145

- aetiology 145 365

- control 146 377

diagnosis

- complement fixation test 146
- differential from Rocky Mountain fever 539

- dry blood agglutination test 372
- and epidemic typhus relationship between 383

- immunization experimental 153

Rickettsiae

- cultivation 381 681

- isolated from *Echidnophaga gallinacea* 146

- symptoms atypical 376

- transmission experimental by *Echidnophaga gallinacea* 614

- treatment by prontosil 614

virus, 544

- epidemic typhus (loupe-borne) (680)

- in Abyssinia, 348

- Algeria 823

- Belgian Congo 823

- Chile 367

- Colombia 140 452 542, 678

- Egypt 823

- Eire 138

- Eritrea, 823

- Germany 755

- in prison camps, 675

- Kenya, 823

- Manchuria, 370

- Morocco 370

- Morocco, 823

- Poland 372, 678 751 824

- South Africa, 823

- Spain 139 140 370 540

- Tanganyika 823

- Tunis 823

- Uganda, 823

- U.S.S.R. 370

aetiology 365

- atypical 541

- cerebral types 824

- complications, 755

- bronchopneumonia, treatment by sulphapyridine 679

- kidney lesions, 367

- control 142, 678

- in Britain, 370

- German colonization of Poland 372

- malinin solution, 751

- convalescence sequelae during 542

- diagnosis 367 678

- differential from

- cerebrospinal meningitis 754

- encephalitis epidemic, 754

- influenza, 754

- measles, 754

- pneumonia 754

- trench fever 754

- typhoid fever 754

Typhus Group of Fevers—*cont.*epidemic typhus (louse-borne)—*cont.*diagnosis—*cont.*

dry-blood agglutination test 372, 478

histological examination of rash area, (785)

Proteus 3 19 141

dissection in, 14

and endemic typhus relationship between, 335

epidemiology 375

experimental study 141

experimental, influence of a diamineous C on 374

immunization

mice 455

vaccination by murine virus 153

infectious type 824

mouse-lung cultures, 753

polymerization with urticaria and, 84

prophylaxis 142, 367 375

Rickettsia prowazekii cults non 681

Rickettsiae cultivation of 281

and Rocky Mountain fever immunological relationship between, 151

simulating pyendocarditis, 84

sporadic, in Germany 54*

symptomatology 369 541 754

transmission, 375

blood smear, 755

experiments, 366

treatment, 367 369 755

steban and plasmodium 679

Kusatzblut, 824

Hunger infection 824

serum, 369

sulphonamides

the 1034 826

sulphapyridine 650

vaccination Cox yolk sac vaccine 140

vaccine preparation of, 454

virus, 455

exanthematic typhus or epidemic typhus

immunization 283 541 547 548 612, (682)

experimental, vaccine prepared from infected gerbils, 820

imitations of 285

studies 543

infection index, 611

louse

artificial infection of, 366

breeding, 366

and malaria, comparative morbid anatomy 367

mice-borne

serology 365

nerv. manifestations in, 377

relation to endemic typhus

Proteus Y agglutination, in normal sera, 137

Proteus XA YZ and X12 agglutination reacting with 753

Q fever

in Canada, 201

serology 365

experimental, pneumonitis and, 380

histopathology, 830

Rickettsiae cultivation of, 281

virus, 545

Typhus Group of Fevers—*cont.*

Rickettsiae

cultivation

in duck's eggs, 147

experiments, 383

human and murine, relationship between, 143

toxin of 538

of wild rabbits, 379

Rickettsial infections in man, 365

shock typhus or endemic typhus

Summary of Recent Abstracts, 655-683

susceptibility of South African gerbils to in vaccine preparation, 7

symptoms, 61

cerebral, (142)

tick borne

in Abyssinia, 348

Brazil, 378 452, 453

Mina Gemes, 151 152, 545 826

Canada, 378

Colombia, 378

U.S.A. 378

boutonneuse fever

in French Equatorial Africa, 375

serology 365

diagnosis, 152

laboratory findings in, 151

Rickettsiae cultivation, 281

Rocky Mountain fever

in Canada 701

Colombia, 615

U.S.A. 148 149 150

Wyoming, 379

serology 365

diagnosis

complement fixation test, 680

differential, from endemic typhus, 539

and epidemic typhus, immunological

relationship between, 151

epidemiology 148

immunization, 546

pathology of, 149

Rickettsiae

cultivation of, 281

of low virulence, 379

virus

pulmonary inoculation of, 548

survival in O. turicata 829

São Paulo fever

serology 365

virus, survival in O. turicata, 829

South African tick typhus, serology 365

symptoms, 645

transmission

Harmaphysalis ticks 152

RA. psorophalus angustus, 787

virus 452

transmission by blood transfusion, 824

treatment

serum, 611

sulphapyridine 452

trunk fever 154 155

in Germany, 396

Spain, 386

serology 365

diagnosis 366

differential from typhoid fever 753

Typhus Group of Fevers—cont.trench fever—*cont.*diagnosis—*cont.*differential from—*cont.*

typhus, 754

undulant fever 758

Rickettsiae of, 185

symptomatology 758

treatment

pyramidon, 788

sulphapyridine 386

failure of, 758

tartar emetic, 386

in vaccinated persons, 385

vaccines, 547 548

Weil-Felix reaction

in infections with Proteus and *Pseudomonas**aeruginosa* 822

of normal sera, 821

Ulcers

of ankle treatment, 413

chronic, treatment, 648

corneal, treatment by albucid soluble, 402

streptococcal of extremities

in U.S.A. 895

treatment by sulphanilamide 896

tropical

in Abyssinia, 575

Gulf of Guinea, 348

India, Coorg, 895

Trinidad, 792

aetiology 575 792

of toes

in Trinidad 49

treatment, 49

treatment, 875 792

shark liver oil, 412

sulphonamides, 50 412

varicose treatment by sulphonamides 896

Undulant fever

in China, Peipang, 813

diagnosis, differential 250

from trench fever 758

Weil-Felix reaction in, 396

Urticaria

due to trypanamide, 241

and polyneuritis in typhus, 542

Vaccina, pustule yaws infection of, 39**Vandellia plicata attacking man treatment, 578****Veneral diseases**

in Abyssinia, 348

China, 893

Canton, 870

Gulf of Guinea, 348

U.S.S.R., 890

VENOMS AND ANTIVENOMES, 405-410 640-

642, 718-720 787-789 884-

888

Venomsscorpion *Tityus serrulatus* 409

snake

of Gulf of Guinea, 348

Acanthophis antarcticus treatment by

pituitrin, 640

*Bothrops**atrox* 640*godmani* 640*lanibergii* 640**Venoms—cont**snake—*cont**Bothrops—cont.**lateralis* 640*nasutus* 640*nigroviridis nigroviridis* 640*nummifera* 640*schlegelii*, 640*Bungarus fasciatus* enzymes of 718*Cerastes cornutus* 886

cobra

sterilization of 884

therapeutic use of

in cancer 407

epilepsy 407

Crotalus terrificus

antagonism of mineral waters to 406

toxicity of 405

Echis carinata, enzymes of 718

fluorescence of 885

haemolytic action of 885

hypoglycaemia due to 787

Lachesis muta 640*Micrurus frontalis* toxicity of 641*Naja Asya* 886*naja* enzymes of 718*tripedians*

attenuation of 788

separation of neurotoxin from crude

venom, 405

Notechis scutatus

haemostatic properties of 405

separation of coagulant from toxic prin-

ciples of 405

sea 408

sterility of solutions of 407

viper

haemostatic properties of, 407

toxicity of blood of, 788

Vipers*aspis*

attenuation of, 788

effect on guinea pig mesentery 884

russellii

enzymes of 718

neutralization by homologous anti

serum, 719

sterilization of 884

Spider

black widow 410 641 720

Latrodectus lugubris 409

tarantulas, 642

therapeutic use of

in cancer 407

epilepsy 407

Verruga peruviana *see under* BARTONELLOSIVibrios *see under* CHOLERA**Vital Statistics**

in British Guiana, 203

West Africa, 203

Vitamin

deficiency

in Dutch East Indian diet, 329

Indian diet, 328 329

metabolism of West African negroes 831

relation to helminthiasis resistance 624

Vitamin A

red palm oil, production of, 327

relation to Strangyloides immunity 632

Vitamin B

deficiency syndrome due to 337

PP factor of, 574

Vitamin B₁₂ content of human milk, 333

Vitamin K deficiency associated with non tropical sprue 45

Yidigo, diagnosis differential from

blue disease 643

yéru-yéru, 114

Wassermann reaction

in leprosy 224

malaria, 119

pinta, 112, 113

yaws, 400

Water, ground- pollution, in alkaline alluvium soil, 410

Well's disease *see* LEPTOSPIROSIS

Weil-Felix reaction

in rat-bite fever, 345

trachoma, 890

typhus, 821 822

Whooping cough

in China, Peking, 613

Gulf of Guinea, 348

W.K.K. antigen, preparation of, 525

Wolhyman fever *see* TYPHUS GROUP OF FEVERS, trench fever

Women, diseases of, in tropics, 203

Wuchereria

brucei

in Sedan, 183

causing granulomatous lymphadenitis 571

development in *Culex fatigans*, (185)

examination of, in day blood, 183

infection, in India, in rural area, 477

larvae behaviour of, 477

malayi

adult, 184

susceptibility of *Culex roxii* to, 185

Yersinia spp., growth of, effect of temperature and humidity on, 301

Yersinia

scholae, distribution of, 306

brucellae, distribution of, 306

cholepsi

in U.S.A. Ohio 307

distribution of, 306

transmitting *Pl. asiaticus* infection, 576

YAWS, 400-461 695 842-850

YAWS AND SYPHILIS 35-43

Yaws

in Belgian Congo, 38

Colombia, 41 695

Valle del Cauca, 38

Gulf of Guinea, 343

Philippine Islands, 400

Solomon Islands, (36)

etiology 38

and avitaminosis C, 38

control, 277

in Colombia, 41

curvature of little finger in, 41

Yaws—*cont.*

diagnosis, differential, from

leprosy 849

pari-pari, 114

histopathology 849

infection of vacuina pustule 39

leprosy rash in, 39

lesions of nasal cavity 39

relation to gonorrhea, 400

sera, reaction of, in quantitative complement

fixation test for syphilis and

tuberculosis, 41

symptoms, 38, 695

transmission, 38

treatment, (39) 277 695

Wassermann reaction of cerebrospinal fluid 400

YELLOW FEVER, 64-79 453-458, 545-549

615, 653-686, 759-762, 843

Yellow fever (63) (79)

in Africa, 63

importance of, (633)

Central America, 683

Colombia, 68, 73, 615

Costa Rica, 634

Cuba, (79)

French Equatorial Africa, 700

Gambia, 65

Gold Coast, 65 66, 78

Mexico, 683

Panama, 684

Salvador 684

Sierra Leone, 65

South America, 683

Sudan, 64 66, 69 72, 453, 456 457

Uganda, 455 615 759

blood in, 548

control, 68, 73, 277 683

in East Africa, 73 78

diagnosis, 70 76

differential, 457 686

vaccination 73

experimental, in Sedan, 685

histology 74

immunity

in Sedan, 455

Uganda, 455

incubation, 78, 549

period of protection of, 849

vaccination, sera- limitations of, 78

vacuina high and low subcultures of, 77

jaundice

in Bolivia, 615

Brasil, 615

Colombia, 68, 73, 615

French Equatorial Africa, 700

Pera, 615

Uganda, 615

Venezuela, 615

research, 615

pathology relationship to Rift Valley fever 456

Yellow Fever—cont.

- protection tests
 - in French Equatorial Africa, 760
 - Sudan, 455
 - Uganda, 455 759
- research 615
- service in Brazil, (79)
- smallpox and mixed vaccination 761
- Summary of Recent Abstracts, 61-64
- transmission, *see also* *Aedes*
 - aircraft, control, 458, 549
 - Haemagogus* spp., 68 615 684

Yellow Fever—cont

- transmission—*cont*
 - mosquitoes of the Sudan, 72, 685
 - transport and 68 458 549
- treatment, 277 548
- vaccines, 686
 - comparison of high and low subcultures of 17D 77
 - skin reactions following 762
- virus, neurotropic, localization of in central nervous system, 761

INDEX OF COUNTRIES

EUROPE

- Albania
 - Anopheles* of, (253) 389
 - malaria, 389 438
 - in Italian troops 601
- Bulgaria
 - Anopheles* of, 601
 - Gongylonema pulchrum* infection 633
 - malaria, 602
- Czechoslovakia
 - Anopheles* of, 595
- Eire
 - typhus 138
- Estonia
 - leprosy 462 (857)
- Europe
 - typhus, 541
- Germany
 - helminthiasis in persons returning from Africa, 859
 - trench fever 396
 - typhus, 542, 675 755
 - in Russian prisoners of war 611
- Great Britain
 - Coccidioides immitis* in human brain, 631
 - histoplasmosis, 645
- Hungary
 - kala azar 673
 - rabies, control 85
- Ireland Northern
 - amoebiasis liver abscess 316
 - pellagra, 335
- Italy
 - malaria, 18 22, 262
 - pellagra, 709
 - Strongyloides stercoralis* infection 101
- Macedonia
 - malaria, 389
- Poland
 - typhus, 372 452, 678 751 824
- Sardinia
 - malaria, 19 23
- Spain
 - hydatid cysts 96
 - kala azar infantile 606
 - relapsing fever 342

Spain—cont

- trench fever 396
- typhus, 139 140 370 540 611
- Turkey
 - rabies, 84
- U.S.S.R.
 - amoebiasis 890
 - Anopheles* of 890
 - anthrax, 890
 - blackwater fever 890
 - cholera, 890
 - diphtheria 890
 - dysentery bacillary 890
 - in children, 324
 - intestinal protozoa, 890
 - experiments 555
 - leprosy 890
 - malaria, 250 516 517 890
 - in children, 520
 - congenital, 518
 - paratyphoid fever 890
 - plague 890
 - relapsing fever 250
 - sandfly fever 890
 - scarlet fever 890
 - smallpox, 890
 - syphilis 890
 - trachoma, 890
 - tularaemia, 890
 - typhoid fever 890
 - typhus, 370 890
 - venereal diseases, 890

ASIA**Assam**

- Anopheles* of, 428 598
 - leishmaniasis, in bullock, 537
 - leptospirosis, 347
 - malaria, 177 180 251 435 598
 - control, 435 603
 - rabies, 83
 - typhus, 147
- Barma**
- plague 277
 - typhus 614
- Burma-China Highway**
- malaria, 277

- Ceylon
 ankylostomiasis, 570
 malaria, 603
 control, 603
 paratyphoid fever 414
 trachoma, 603
- China
 amoebiasis, 613
 ankylostomiasis, 603
 Anopheles of Human, 251
 anthrax, 613
 anti-rabies work of League of Nations, 277
 ascariasis, 603
 balantidiasis, in Chefoo, 33
 beriberi, 603
 experiments and prejudices in relation to (204)
 cholera, 159, 277 613
 control, 27
 cirrhosis of liver, 603
 Chinese malarious m. return, 603
 dysentery, 613
 bacillary 613
 bacterial, in Ch'ed, 33
 venema, 217
 encephalitis, 613
 enteric, 603
 erysipelas, 613
 fly population, 650
 gastric cancer, 277 649
 kala-azar, 167 168 448 613
 leishmaniasis, 496
 leishmaniasis, cancer 160
 leprosy, 217 603
 malaria, 251, 268, 613, 603
 server in West Yunnan, (177)
 miasmata, 613
 parasites of dogs, cats and rats, in Chefoo, 627
 paratyphoid fever 613
 plague control, 27
 pneumonia, 613
 poliomyelitis, 613
 rabies, 61 613
 relapsing fever 277 613
 scabies, 71
 scarlet fever 613
 schistosomiasis, in Yunnan (11)
 skin diseases, 603
 smallpox, 613
 control, 277
 streptococcal, intestinal, among war
 refugees in Shanghai, 328
 tetanus, 613
 trachoma, 412, 603
 tuberculosis, 603
 typhoid fever 613 603
 typhus, 144 277 613
 control, 27
 undulant fever 613
 venereal diseases, 603
 whooping cough, 613
- China Burma Highway
 malaria, 277
- Dutch East Indies—cont.
 dysentery bacillary 325
 in Bataavian children, 198
 Echinostoma infection, 629
 in Celebes, 14
 Echinostomes of man, 365
 encephalitis, in Bataavian children, 198
 Government Leprosy Establishment and Pa-
 tenter Institute 1891-1945 (144)
 hay fever 417
 Hymenolepis war infection, 630
 leptospirosis, in Java, 347
 malaria, 254 264 736
 miasmata, in Bataavian children, 198
 Pasteur Institute and Vaccine Institute 1891-
 1945, (791)
 plague in Java, 552
 poisonous plants, in Java, 82
 rat-bite fever in Ambolna, 127
 rhinoceros, 648
 Rickettsial diseases, (146)
 schistosomiasis, 628
 typhoid bacilli, in Bandonek sewerage, 197
- Federated Malay States
 Anopheles of, 256
 malaria, 182, 256
 Advisory Board, annual report 1940 254
 nutrition, 227 (126)
 typhoid fever in Singapore 48
- Hong Kong
 blackwater fever 274
- India
 Amoebiasis, 555
 ascariasis, 605
 in pregnant women, 735
 ankylostomiasis, 604
 Anopheles of
 Madras 398
 Orissa, 299
 ascariasis, 571
 Atractodes-ascariasis, 560
 beriberi, 330
 blackwater fever (274) 431
 blood of Calcutta women, 431
 cholera, 157 158 159 456 600
 research, 606
 cirrhosis of liver, infantile, 415
 coxysarcocystis, acute follicular 401
 dengue (?), 633
 diet, 323 329
 dracunculiasis, 603
 drosophila epidemic, 713
 dysentery bacillary 552
 eye diseases 404
 filarial
 lesion of spleen, 707
 hemiparasitism, 185 477
 frostbite sore, 606
 hemiparasitism 733
 impetigo, 606
 kala-azar 448 45
 leprosy 718, 226 357 604
 surveys, 831
 leptospirosis, 346
 malaria, 259 299 437 448 606, 604
 cerebral, 393
 control, 603 607 608
 m. infection, 251
 miasmata 578

India—cont.

- oriental sore 173
- pellagra, (711) 879
- plague, 300 836
- rhinoscleroma, 199
- rhinosporidiosis, in Bombay 413
- sandfly fever 155
- trichinosis, 836
- trichinosis, 782
- Trichophyton crateriforme* infection 103
- Trichostrongylus* infection, 775
- typhus 375 827
- ulcers
 - tropical, 895
 - varicose 896

Wuchereria bancrofti infection in rural area, 477

Indo-China

- blackwater fever 531
- Fasciolopsis buski* infection in man and dog, 13
- leprosy 230
- malaria, 177 180
- maternity and child-welfare in Tonking 57
- trematodes of domestic animals, in Tonking (16)

Japan

- ankylostomiasis, in Isigaki Island 97
- Diphyllobothrium mansoni* infection, 90
- filariasis 183

Malaya

- cancer of liver 578

Manchuria

- atriplicity, in Mukden 53
- typhus fever 370

Nova Goa

- pemphigus, 278

Palestine

- Anopheles of 582
- favism in children, 278
- harrara, in Australian troops, 577
- kala azar canine, 747
- malaria, 592
- oriental sore, 749 750

Philippine Islands

- ankylostomiasis, 218
- leprosy 216 217 222 223
 - in child 222
- malaria, 523
 - oculic infection 116
- nona, 411
- schistosomiasis 11 468, 467
 - survey 468
- typhus 378
- yaws 460

Syria

- Anopheles of, 516

Thailand

- Fasciolopsis buski* infection, 564

Turkestan

- oriental sore, 610

AFRICA

Abyssinia

- amebiasis, 348
- Anopheles 391
- dysentery bacillary 348
- kala azar 348 608
- lymphogranuloma inguinale 348
- malaria, 348 391
 - in children, 17

Abyssinia—cont.

- relapsing fever 348, 556 846
- typhus, 348
- ulcer tropical 575
- venereal diseases, 348

Africa,

- Coenurus infection in native 872
- leptospirosis 847
- yellow fever
 - distribution, 65
 - importance of (833)

Africa, East

- diseases of, 348
- yellow fever control, 73 78

Africa French Equatorial

- bostonneuse fever 375
- rat bite fever 345
- trypanosomiasis, 237
- typhus, 375
- yellow fever 780

Africa, French West

- malaria, in Mauritania, 603
- sypthilla, 444
- trypanosomiasis, 444 744

Africa, North

- typhus 823

Africa Portuguese East

- Anopheles of, 294

Africa, Portuguese West

- trypanosomiasis, 603

Africa, West

- dracunculiasis, 778
- labour conditions, (420)
- vital statistics, 203

Algeria

- typhus 811 823

Bechuanaland

- trypanosomiasis, 236

Belgian Congo

- diboba, 99
- filariasis, 859
- malaria, 663
- pellagra, 636
- schistosomiasis, in young children, 624
- trypanosomiasis 816
- typhus, 823
- yaws 38

Cameroons

- filariasis, 859
- malaria 663
- trypanosomiasis, 743

Dahomey

- malaria 663

Egypt

- dysentery 691
- Prosimonius* virus infection, 770
- trachoma 687
- typhus, 823

Ethiopia

- typhus, 823

French Guinea

- malaria, 663

Gabon

- loa loa, 870
- malaria, 663 870
- schistosomiasis 870
- venereal diseases, 870

Gambia

- yellow fever 65

Index of Countries

- Gold Coast
 anaemia, macrocytic, in women, 482
 glossitis, nutritional, 783
 malaria, 663
 sickness and tuberculosis, among mine workers
 in, 580
 trypanosomiasis, 532
 yellow fever 65 66, 76
 Ivory Coast
 malaria, 663
 Kenya
 Anopheles, of Kisumu, 653
 Glossina palpalis control, experiments, 653
 mecthodes, pyrethrum powder 577
 kala azar 348
 in troops, 748
 malaria, 663
 control, 396
 plague, 687 636
 typhus, 612
 Liberia
 malaria, 663
 native medicine of Mano tribe, (493)
 Libya
 relapsing fever 848
 Moçambique
 mosquitoes of 350
 Morocco
 typhus, 611 623
 Nigeria
 eye diseases, 660
 cataract, 680
 conjunctivitis, 680
 leprosy 830
 Opi River settlement, (233)
 malaria, 663
 trachoma, 680
 trypanosomiasis, 442
 typhus, 766
 Northern Rhodesia
 anaemia, megalocytic, 482
 nutrition of native labourers, 66
 thrombophlebitis, 190
 Portuguese Guinea
 malaria, 663
 Senegambia
 malaria, 663
 Sierra Leone
 Anopheles, of Freetown, 253
 malaria, 663
 mosquito control, 814
 mumps, 411
 yellow fever 65
 Northern Rhodesia
 anaemia, sub-clinical, in children, 683
 Chrysomys bezziae infection of cattle, 443
 Coryliobis anthropophaga infection, 443
 leprosy 686
 mumps, intestinal, 443
 schistosomiasis, 11 660
 trypanosomiasis, bovine, 443
 Spanish Guinea
 alimentary diseases, 348
 amoebiasis, 348
 anaemia, hookworm, 348
 arthritis, 348
 dyspepsia, 348
 dermatoses, 348
 mumps, 348
 Spanish Guinea—cont.
 dracontiasis, 348
 dysentery 348
 enteritis, 348
 filariasis, 348, 650
 foundos, (41) 460
 helminthiasis, 348
 pecta-articular nodes, 348
 leprosy 348
 lymphogranuloma inguinale, 348
 Madura foot, 348
 malaria, 348
 measles, 348
 myositis, 348
 neurological diseases, 348
 onchocerciasis, 348
 osteomyelitis, 348
 polyarthritides, rheumatic, 348
 pulmonary diseases, 348
 rheumatic fever 348
 smallpox, 348
 syphilis, 348
 tetanus, 348
 tuberculosis, 348
 trypanosomiasis, 348, 460
 ulcers, tropical, 348
 venereal diseases, 348
 snobs, snobs, 348
 whooping cough, 348
 yaws, 348
 Sudan
 hepatitis, 457
 kala azar 609 747
 leishmaniasis, oral pharyngeal, 749
 leprosy 651
 lom lom, 168
 malaria, 666
 in troops, 253
 oriental sore 609
 relapsing fever 457
 trachoma, 401
 Wuchereria bancrofti, 168
 yellow fever 64 68, 69 72, 450
 Swaziland
 malaria, 660
 Tanganyika
 deficiency diseases, 325
 medical training of natives, ()
 night blindness, 325
 nutrition in, 325 326
 pellagra, 325
 relapsing fever 125
 scurvy 325
 trypanosomiasis, 818
 typhus, 623
 Togo
 malaria, 663
 trypanosomiasis, 744
 Tuvalu
 ankylostomiasis, 473
 Asiatic dengue (516)
 Fasciola hepatica infect
 helminthiasis, 473
 larvivorous fish of, (60)
 rabies, 580 591
 relapsing fever 342
 schistosomiasis, 766
 trachoma 667
 typhus, 611 623

Uganda

- beriberi, 325
 - deficiency diseases, 325
 - diet in, 325
 - jaundice, 896
 - liver diseases, 896
 - malaria, 361
 - rhinosporidiosis, in native, 413
 - scurvy 325
 - trypanosomiasis, 442
 - typhus, 823
 - yellow fever 455 615 759
- Union of South Africa
- amoebiasis
 - in Witwatersrand, 313
 - pulmonary in Natal, 29 31 619
 - cancer of liver in Bantus, 488 578
 - diseases tropical, of Witwatersrand, (48)
 - health service among rural Bantus 832
 - housing of native labourers on Rand mines, 57
 - leprosy 232
 - plague, 302
 - poisonous plants of 51 200 899 900
 - rabies control, 86
 - relapsing fever 343
 - sporotrichosis, in Witwatersrand gold mines 108
 - typhus, 823

AMERICA, NORTH

America, North

- malaria, (292)
 - Human Symposium on (book review) 483
- British Columbia
- rat fleas of 306
- Canada

- amoebiasis, 554
 - Dermacentor andersoni* as disease carrier 201
 - plague 303
 - Q fever 201
 - Rocky Mountain fever 201
 - tick paralysis, 201
 - tularaemia, 201
 - typhus fever 378
- United States
- albinism, 488
 - amoebiasis 554 839 840 841 842
 - cutaneous, 32
 - anaemia, sickle-cell, 716 717
 - ankylostomiasis, 772
 - Anopheles of Eastern States, distinguishing of (296)
 - ascariasis, 838
 - blackwater fever 870
 - haemoglobinuria, 274
 - blood of high-school children, 480 481
 - Chagas's disease 244
 - chromoblastomycosis, 106
 - coccidioidomycosis, 790
 - creeping eruption, 774
 - deficiency diseases, in Alabama 339
 - Dirofilaria immitis* infection, 180
 - dysentery 690
 - Enterobius* infection, (782) 877
 - appendiceal, 634
 - incidence of, 191
 - eosinophilia, extreme, and leucocytes, in children, 483

United States—cont

- Giardia intestinalis* infection 32 621
- histoplasmosis 109 645
 - pulmonary 484
- Hymenolepis nana* infection, 838
- keratitis, 839
- leprosy 219 695 698 852
- lymphogranuloma inguinale in Georgia, 50
- malaria 387 388, 393 400 438
 - control, in Tennessee Valley 261 262 438 740
- myiasis urinary 492
- Necator infection 858
 - in naval personnel, 472
- pellagra, 335 636
- plague 303 762
 - sylvatic, 549
- rabies 591
 - vaccines, 590
- rat bite fever 693 694
 - in infant, 127
- relapsing fever 343 344 556
- Rocky Mountain fever 148 149 150 379
- schistosoma dermatitis, 12, 567
- sclerosis, multiple, in negroes, 897
- swimmers itch 566
- syphilis, 387
- tick paralysis 649
- trachoma, 887 888
- Triatomidae of South-western States 445
- trichiniasis 184 196 477 (782)
- Trichuris infection, 858
- Trypanosoma cruzi* distribution of in South western States 244
- typhus fever 145 377 378
- ulcers, streptococcal, of extremities 895

AMERICA CENTRAL

British Honduras

- Anopheles 296 738
 - malaria, 296 430 736
- Caribbean area
- malaria, 436
 - Human Symposium on (book review) 483
- Costa Rica
- Anopheles, 290 291 296
 - blastomycosis, 644
 - Chagas's disease 606
 - malaria, 290 291
 - control, 291
 - yellow fever 683
- Guatemala
- hydatid disease of pigs, 706
 - malaria, 430
- Honduras
- snake venoma, 640
- Mexico
- amoebiasis, 313 619
 - Anopheles of 286
 - Chilomastix infection 313
 - Giardia intestinalis* infection, 313
 - intestinal protozoa, in school-children 619
 - malaria, 430
 - onchocerciasis 572 778
 - Smuliidae of (189)
 - Trichomonas infection, 313
 - typhus fever 370
 - yellow fever 683

- Panama
 Canal health department, report 1940 (575)
 yellow fever 663
 Salvador
 yellow fever 663

WEST INDIES

- Cuba
 Anopheles, 513, 514, 515
Fasciola hepatica infection, in Habana, 14
 leprosy 219
 malaria, 513, 514, 515
 pinta, 110, 111
 yellow fever (79)
 Dutch West Indies
 dysentery bacillary in Curaçao, 552
 Leeward Islands
 Malaria, 183
 Porto Rico
 amoebiasis, 618, 638
 ankylostomiasis, 636
 ascariasis, 636
Bufo marinus, as vector of helminth ova, 561
 leprosy 219
 pinta, 110
 schistosomiasis, 663
 sprue, 638
 Strongyloides infection, 638
 Trinidad
 Anopheles, 664
 avitaminosis, (207)
 epithelial dystrophy of cornea, 403
 malaria, 664
 polypentaria, in oil workers, 328
 blenna, tropical, 792
 of toes, 49
 West Indies
 coral dermatitis, 114
 tapeworm infection (63)

AMERICA, SOUTH

- Argentina
 ankylostomiasis, in Corrientes Province, 26
 Chagas's disease, 244, 246, 249, 336
 distomiasis, cutaneous, 565
 hepatitis, 418
 leprosy 218
 Madura foot, 107
 malaria, 151, 292, 427
 pellagra, 784
 plague, 305, 309, 762, 763
 syphilitic, 303
 trypanosomiasis 445
 Bolivia
 yellow fever 615
 Brazil
 actinomycosis of thorax, 644
 amoebiasis, 5
 ankylostomiasis, 473
 on coffee plantations, (476)
 Anopheles
 of São Paulo, 737
 S. Vacante, 297 (816)
 ascariasis, 5, 473
 balantidiasis, 6

- Brazil—cont.
Blastocystis hominis infection, 5
 Chagas's disease 247
Callosmator muris infection, 5
Emadomonas rubertralis infection, 5
Endolimax nana infection, 5
 Entrobrius infection, 5
Enteromonas hominis (?) infection, 5
 giardiasis, 5
 helminthiasis, 5
 histoplasmosis, 645
 Hymenolepis infection, 5
Iodamoeba bitrichi infection, 5
 leishmaniasis, 673, 674
 canine 169
 cutaneous, 175
 leprosy 218, 462
 malaria, 735, 813
 avian, 400
 pernicious, 223
 mycetozoa, 107
 Necator infection, 5, 473
 on coffee and sugar cane plantation (476)
 oriental sore, 609, 610
 Philobotomus spp. of São Paulo (811)
 plague, 306, 551
 bubonic (book review) 495
 rashes, 63
 rheumatism, 606
 schistosomiasis, 5, 465, 466, 700
 sprue 43
 Strongyloides infection, 5
 taeniasis, 5
 Trichomonas infection, 5
 Trichine infection, 5, 473
 typhus, 151, 152, 378, 452, 545, 828
 yellow fever 615
 syphilitic, (79)
 British Guiana
 leprosy 652
 malaria, 204
 vital statistics, 205
 Chile
 bartonellosis, 662
 Chagas's disease, 246
 hydatid disease 469
 malaria, 427
 pellagra, 710
 typhus, 367, 752
 Colombia
 blue dermatosis, in Chillo Plateau, 113,
 cinchonas of, 433
 hydatid cyst, (706)
 leishmaniasis, cutaneous, 174
 leprosy 568
 malaria, 809
 monkeys of, as reservoirs of tropical dis
 791
 Rocky Mountain fever 615
 trypanosomiasis, (247)
 trypanosomiasis, 820
 typhus, 140, 378, 452, 542, 678
 verruga peruana, (833)
 yaws, 36, 41, 603
 yellow fever 66, 73, 615
 Ecuador
 pinta, (111)
 plague, 303

Paraguay
 leprosy 221
 plague 303
 Peru
 cysticercosis cerebral 468
 leprosy (219)
 plague 303
 yellow fever 615
 Uruguay
 Chagas's disease, 536
 cysticercosis 704
 plague 687
 Venezuela
 amoebiasis, 465
 ascariasis 465
 Chagas's disease, 246 746
 kala azar 607
 Necator infection 465
 pinta, 109
 rabies paralytic, 87
 schistosomiasis, 8 465 885
Tricocytis infection, 103
 Trichuris infection, 465
 yellow fever 615

AUSTRALASIA

Australia
 snake bite 640
 Australasia
 hydatid cysts 95
 New Zealand
 hydatid disease 169
 alveolar 470

SOUTH SEA ISLANDS

Hawaii
 leprosy 224
 Nauru
 beriberi infantile, 331
 Echinoderm infection 486
 filariasis, 571
 medical work (331)
 New Guinea
 infectious diseases, (791)
 Samoa
 ascariasis 872
 Enterobius infection, 872
 Necator infection, 872
 Strongyloides infection, 872
 Trichuris infection, 872
 Solomon Islands
 yaws, (39)